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CONTRIBUTIONS

TO THE

NATURAL HISTORY OF ALASKA.

RESULTS OF INVESTIGATIONS MADE CHIEFLY IN THE YUKON DISTRICT AND THE ALEUTIAN ISLANDS; CONDUCTED UNDER THE AUSPICES OF THE SIGNAL SERVICE, UNITED STATES ARMY, EXTENDING FROM MAY, 1874, TO AUGUST, 1881.

PREPARED UNDER THE DIRECTION OF

BRIG. AND BVT. MAJ. GEN. W. B. HAZEN.

CHIEF SIGNAL OFFICER OF THE ARMY,

BY

L. M. TURNER.

No. II.

ARCTIC SERIES OF PUBLICATIONS ISSUED IN CONNECTION WITH THE SIGNAL SERVICE, U. S. ARMY.

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LETTER OF TRANSMITTAL.

NATIONAL MUSEUM, *April* 25, 1882.

SIR: Herewith I have the honor to transmit to you for publication the following notes made by me in the Territory of Alaska during the years 1874 to 1881, under the direction of the Chief Signal Officer, U. S. Army, and in connection with the National Museum, under the direction of Prof. S. F. Baird, Secretary of the Smithsonian Institution.

A brief recital of the various localities visited by me is necessary.

Under special orders I was directed by the Chief Signal Officer to proceed to Saint Michael's, Alaska, and there establish a meteorological station. I arrived at Saint Michael's May 25, 1874, and began taking meteorological observations June 26, 1874. During my leisure time I was employed in obtaining such objects pertaining to the natural history of that region as could be done. The collection embraced specimens of plants, insects, fishes, birds, mammals, and a great quantity of ethnological matter, together with extensive vocabularies of the Unálēt, Malémūt, Nulato Ingā-lēt, and Aleut languages. Each of these subjects received the fullest attention that the means and time at my disposition would allow; special attention being given to obtaining a full series of the birds of that region and to collecting all ethnological material possible. Several species of fishes and birds had not hitherto been detected within North American limits.

This work was prosecuted until I signified my desire to return to civilization and was relieved, at my own request, by Private E. W. Nelson, Signal Corps, U. S. Army, who assumed charge of the meteorological duties and other work, under special orders from the Chief Signal Officer.

To Private Nelson was turned over all Government property under my charge, July 14, 1877.

I returned to Washington City, and at my own request was discharged from the Signal Corps, U. S. Army.

On the 6th of March, 1878, I again was connected with the Signal Corps, and, under special orders from the Chief Signal Officer, was directed to proceed to Unalashka Island, Alaska, and after establishing a meteorological station at that place, to also establish stations at Attu, Atkha, Belkovsky, Fort Alexander (Bristol Bay), and Saint Paul Island, of the Pribylof Group.

I arrived at Unalashka May 8, 1878, and proceeded to Fort Alexander to establish the station at that place. I secured the co-operation of Mr. J. W. Clark, to whom was intrusted a full set of meteorological instruments, excepting barometers, of which I had none even for myself, and stationery. On my return to Unalashka in the early part of July, 1878, I soon departed for Belkovsky, for the purpose of establishing a meteorological station at that place, but not finding a person there whom I considered of sufficient intelligence and reliability to perform the work, I was compelled to abandon that station. At Unalashka there was no one to take observations during my absence, and lateness of the season prevented me from going to the western part of the Aleutian Islands to establish stations at Atkha and Attu. At Saint Paul Island I secured the services of Mr. H. W. McIntyre, who promised to take observations at that place.

In May, 1879, I visited the island of Atkha, but not finding a white man permanently at that place, I was necessitated to remain there until September, 1879, when I returned to Unalashka; where I remained until June 3, 1880; and upon an opportunity offering I proceeded to Attu to take personal charge of a station at that place. I remained at Attu until June, 1881, and returned to Unalashka to be relieved of further duty by Sergeant S. Applegate, Signal Corps, U. S. Army,

and by the same order was instructed to proceed to Washington City and report to the Chief Signal Officer in person. I departed from Unalashka July 22, 1881, and arrived in Washington City September 15, 1881, where I received instructions to prepare this report from the notes made by me while in Alaska.

Of the difficulties under which I have labored to carry out my instructions, and to procure the number of objects of the natural history of the places visited by me, it is not necessary to relate in this connection.

The report is intended to give only such notes as were made by myself in the field, and only in such instances as are necessary to substantiate my own observations have I made any citations from other works on the subjects under consideration.

The arrangement of subjects is presented under the heads of—

Letter to the Chief Signal Officer.
Physical and descriptive geography.
Meteorology.
Botany.
Fishes.
Birds, with list of other birds known to occur in Alaska.
Mammals.

The subject of meteorology is believed to be sufficiently explicit in itself to require no explanation, other than that the tables are based on the observations as taken by the persons whose names are made in that connection.

The list of plants is that given by Dr. J. T. Rothrock in Smithsonian Report for 1867, and contains those plants principally collected by the employés of the Western Union Telegraph Company, in their exploration connected with the Russian overland telegraph expedition, Dr. Rothrock himself among the number. To this list has been added such plants as were collected by me and identified by Prof. A. Gray, of Harvard University; the ferns by Prof. D. C. Eaton; the grasses by Dr. G. W. Vasey and Mr. Conant, of the Agricultural Department. The order of the list has not been changed from that presented by Dr. Rothrock, and with it are combined such notes and distribution of species as were made by me. There is no doubt but that the list will admit of many additions, there having been so little opportunity to consult and reach all the literature on the entire subject, I could not in time obtain the more recent works so as to present to it in accordance with the recent classifications.

I may justly state in this connection that of all great difficulties the most troublesome was to preserve the plants after I had collected them. The constant moisture of the climate has frequently ruined my entire collection of a summer's work. All that remained after supposing the plants were sufficiently dried would be a mass of mold and dry edges of paper, this being apparently done in less than forty-eight hours' time.

The only reptile obtained by me was a *Rana sylvatica?* from Fort Yukon, just within the Arctic circle, where this species is quite plentiful. This and a species of Bufo from the vicinity of Sitka are the only two batrachians known to me to be found in the Territory.

The collection of fishes was not large, owing to the lack of preservative material in other quantity than merely sufficient to preserve only the rarer and smaller kinds.

To Dr. T. H. Bean, curator of ichthyology of the National Museum, was given the task of elaborating the material, many of the species being new to science and others rare. The notes are given just as made in the field. That they could have been made more extensive by consulting other authors is evident, but such course was not deemed necessary.

The engrossing nature of other work necessarily limited the collection of birds, as it was impossible for me to leave the station for the purpose of making more extensive investigations; and there was no one to whom I could entrust the duties to be performed by me. In the spring and summer, when the birds were most plentiful, preparations of the past season's work had to be attended to, in order to ship them on the expected vessel, whose movements depended entirely on the absence or presence of the ice; so that only the latter part of the summer was available for procuring specimens. During the period from November to the succeeding May few ptarmigan

and an occasional raven will be the only birds seen during that time, hence there are for the greater part of the year but few birds to be added to the collection.

The notes on the birds are, except in few instances, the results of my own observations in the field. Several species collected by me are new to the North American bird fauna, and others, very rare species, which had hitherto been special desiderata. To my own notes is an appendix containing a list of all the birds known to occur within the limits of Alaska. That many more names of birds will be added to the list is only a question of the time when the Territory will be fully investigated by a thorough exploration, as many species are known to be abundant on the borders of the country. Yet the fact of there being no recorded instances of their occurrence in Alaska has been sufficient to exclude them from the list.

Without entering into a detailed account of the manner in which the birds are best obtained in a country whose features have but little in common with others more southern, I could only be sure of securing all the birds I could attend to by being well prepared with a hunting outfit, so far as gun (a fine one made by Parker Bros., West Meriden, Conn.) and ammunition were concerned—for without these it is impossible to obtain specimens where the birds perceptibly become scarcer and wilder each year, due to the introduction of immense quantities of cheap shot-guns that do more harm by scaring than killing in the hands of the native youths. At Saint Michael's the geese and ducks have greatly decreased in numbers, if we may believe the reports of the hunters of former days who bagged many times the quantity which may now be obtained, and this with infinitely better guns and certainly not worse shots. Among the Aleutian Islands the birds have forsaken the vicinity of the villages, and only by visiting the uninhabited islands can a complete series of specimens be obtained, as the people and foxes have driven the birds away. This is noteworthy from the fact that the natives of Attu speak of a large cormorant, which, from the description given by them, could have been none other than the greatly desired Pallas's cormorant (*Phalacrocorax perspicillatus* Pall.). This bird is now not to be found, where but twenty years ago (when no fire-arms were used) it was quite abundant at Attu and among the other Nearer islands.

At the present time most birds are seen as the vessel quietly moves through the still waters. At sea myriads of auks of various kinds sit among the tide streams, feeding on various substances, and are only disturbed by the vessel making a narrow break in their ranks as they stretch away for miles in length, where even in moderately rough weather the birds spend most of their time, each species in a manner by itself, but with an occasional intrusion of a puffin, gull, or other bird in the seriation formed by the gently undulating sea. Though generally each species or it and its congenors keep well together, yet the interval separating the species is generally distinct, even of but few yards or by overlapping ranks but slightly separated.

The gulls and ravens prefer the shingly beach or sands, and carefully scan the surface for a scrap of anything fit or not fit for food. The former sedate and often of solemn mood, the reverse of the wary raven ever on the alert for a trap in which his foot may be caught, for they frequently walk along and instantly jump as though something had exploded directly under it, yet continue its fantastic actions for hours.

The snipe and kindred birds seek the more marshy places, where they abound in their season. But few species of the waders remain in the Aleutian Islands and none in the northern portions of the Territory during the winter. The ducks and geese are widely distributed, and in a great measure modified for the time being by their surroundings in each locality.

The list of mammals presented represents all the known living and fossil species, the greater part being found on the mainland. On the Aleutian Islands the only mammals are the foxes and the seals, with few species of rodentia, of which two species are imported. There are no mice or rats on the extreme western islands at the present time, and only one species of fox, *Vulpes lagopus*. One of the small islands near Kiska Island is said by the natives to be literally honeycombed with the holes of a species of spermophile. I was unable to secure specimens for identification. I was also unable to procure a specimen of the bat, which is plentiful at Kadiak, and occasionally ranges, in the months of July and August, even as far north as Nulato, on the Yukon River.

(A large collection of insects and shells was also made by me, but owing to circumstances beyond my control I am not able to present the notes pertaining to them in this connection, or to give a list of the species.)

It has been deemed advisable to give a list of the principal localities with their geographical position, especially those mentioned in my notes.

Many persons having visited Alaska and thrown into contact with people speaking the Russian language, which has scarcely any affinity with the English, and during their short stay have presumed to have mastered the sounds of consonants and vowels which are peculiar to the Russian language; hence many discrepancies have arisen and resulted in spelling certain words in several erroneous ways. The name of one of the principal large islands of the eastern part of the Aleutian chain has been given thus, Aonalashka, Oonalashka, Oonalaska, Unalaska, and Unalashka. The majority of English writers in spelling the Russian patronymics give an *f* or *ff* as the ending for Russian words which really end in the sound of *f*, and should be so written, as the sound of *f* is *accidental* in all words ending with the hard semivowel ъ, or when placed before strong consonants, and then taking the sound of its corresponding letter ф, which is the pure and simple *f* as used in English.

The following names are believed to be entirely in accordance with the proper sound of the Russian and native names. The latitude and longitude are taken mostly from the determinations made by the U. S. Coast Survey and other authorities. They are sufficiently correct for the purpose intended.

Locality.	Latitude.	Longitude.	Authority.
	° ′ ″	° ′ ″	
U. S. Coast Survey Station, Sitka	57 02 53	135 20 20	U. S. Coast Survey.
Astronomical Station, Saint Paul Harbor, Kadiak	57 47 57	152 21 21	Do.
Karlúk Village, Kadiak	57 34 36	154 24 30	Archimandritof.
Village in Delarof Harbor, Unga Island	55 11 30	160 30 00	U. S. Coast Survey.
Belkóvsky Village	55 05 13	162 00 15	Do.
Cape Petrof, west end of Sannakh Island and Harbor	54 27 00	162 49 00	Do.
Southwest point of entrance to False Pass between Aliaska and Unimak	54 47 04	163 14 00	Voronkovsky.
South Cape, Akután Island	54 01 30	165 59 12	Krenitzin.
North Cape, Undlga Island	53 58 48	166 03 00	Do.
North Cape, Akún Island	54 16 30	165 34 00	Do.
Astronomical Station, Chernovsky Bay	53 23 57	167 29 56	U. S. Coast Survey.
Astronomical Station, Iliuliuk Village, Unalashka Island	53 52 53.7	166 31 44.2	Do.
North point of Umnak Island	53 32 00	167 59 00	Vasilief.
Bogaslof Island	53 58 36	167 59 00	U. S. Coast Survey.
West point of Amlia Island	52 06 30	173 51 18	
Village (astronomical station) on Nazan Bay, Atkha Island	52 10 30	174 15 18	Do.
Korovinsky Peak (volcano, 4,852 feet high)	52 23 30	174 17 18	Pavlof.
Kanaga Peak, on Kanaga Island	51 54 30	177 16 00	Salmatof and others.
Constantine Bay, Astronomical Station, Amchitka Island	51 23 39	179 12 05 E.	U. S. Coast Survey.
Astronomical Station at village, Kyska Harbor, Kyska Island	51 59 04	177 00 00	Do.
Bouldyr Island (E. Cape)	52 34 00	175 49 00	Gibson.
West point of Semichi Islands	52 45 00	173 50 30	Do.
Northeast Cape of Agattu Island	52 27 36	173 36 00 E.	Benzeman and others.
East Cape, Attu Island	52 51 36	173 23 00	Gibson.
Flagstaff in Chichagof Harbor, Attu Island	52 56 00.9	173 12 23.7	U. S. Coast Survey.
Cape Wrangel (the western point of Attu Island)	53 58 00	172 26 00	Gibson.
Oblennoi (Massacre) Bay, south side of Attu	52 49 48	173 05 00	Do.
Mouth of Ugásik River	58 12 42	157 30 00 W	Staninkovich.
Amak Island	55 25 00	163 01 30	Do.
Fort Alexander, on Nushagak River	58 57 06	158 18 24	Wrangel and others.
Cape Newenham	58 42 00	162 05 00	Vasilief and others.
Cape Rumiantzof	61 52 00	166 17 60	Etolin.
West point of Stuart Island	63 35 30	162 32 36	Tebienkof.
Saint Michael's	63 28 00	161 48 00	Mean of Kellelt and Zagoskin.
Unalakhlit	63 53 33	160 30 16	Zagoskin.
Besborough Island	64 06 36	161 07 00	Khramchenko.
Cape Prince of Wales, the westernmost point of mainland of North America	65 32 00	168 05 00	U. S. Coast Survey.
West Cape, Saint George Island	56 37 48	169 48 00	Do.
Southwest Cape, Saint Paul Island	57 10 12	170 28 00	Do.
Southeast point of Saint Matthew Island	60 17 30	172 14 06	Do.
Southeast Cape, Saint Lawrence Island	62 57 00	169 24 30	Pavlof.

Choris Peninsula lies in about 66° 15′ N., and 162° W. long., and is directly north of Chamisso Island, in Eschscholtz Bay, a part of Kotzebue Sound.

Names of other localities mentioned in these papers are believed to be sufficiently explicit.

I desire to express my deep obligations to Prof. S. F. Baird, Secretary of the Smithsonian Institution and Director of the National Museum, in affording me every facility in preparing these pages. To Mr. Robert Ridgway, curator of ornithology of the National Museum, my obligations are deep for the many valuable suggestions he has made. To Dr. L. Stejneger I am under great obligations for suggestions on several subjects, especially those pertaining to *Pyrrhula* and *Motacilla*, which were reviewed by him. Also to Dr. T. H. Bean, curator of ichthology, I am greatly indebted for the identifications of all the fishes collected by me. To Messrs. J. N. McQuestion,

A. Mayo, and J. Harper, of the upper Yukon District, I am deeply indebted for many specimens of birds which I would not otherwise have obtained.

In the Unalashkan District I can but remember with pleasure the facilities afforded me by the Western Fur and Trading Company through their agents, Mr. John Hague, and especially to Mr. Robert King, agent of the district.

To the gentlemen composing the Alaska Commercial Company, in San Francisco, I take pleasure in acknowledging the many favors extended me with extreme courtesy at Saint Michael's and during the first year of my stay at Unalashka.

I am, sir, very respectfully, yours,

LUCIEN M. TURNER.

The CHIEF SIGNAL OFFICER U. S. ARMY,
Washington, D. C.

RESEARCHES IN ALASKA.

Part I.—GENERAL DESCRIPTION.
Part II.—METEOROLOGY.
Part III.—PLANTS.
Part IV.—FISHES.
Part V.—BIRDS.
Part VI.—MAMMALS.

PART I.—GENERAL DESCRIPTION.

PHYSICAL CHARACTERISTICS OF THE COUNTRY.

The character of the country in the vicinity of Saint Michael's is that of a vast moorland, much diversified with low, rolling areas to higher levels on which are situated either high hills or short chains of mountains of not great height, usually surrounded, especially near the coast, by great marshy plains or tundras, on which are numerous lakes of greater or less size, and in most instances connected with each other, or else having short, small outlets which run directly into some one of the numerous coves or arms of the sea, or unite with a larger stream which leads its tortuous way to the smaller tributaries of the great Yukon River. The size of these streams is variable according to the soil through which they wind. In the vicinity of Saint Michael's there are none of sufficient size to be worthy of mention.

Along the eastern side of Norton Bay are several small streams (scarcely of size to be called rivers) which empty into the bay and take their origin among the hills to the eastward and which form the watershed between the Yukon River and Norton Sound. The streams on the eastern side of those hills are tributary to the Yukon, and are of inferior size. The trend of the coast on the eastern side of the sound is northeast and southwest. It contains but few, and those broad, indentations, the general line being incurved and having but few islands on its margin; the larger islands being Stuart and Saint Michael's, the former on the outside of Saint Michael's, and this only separated by a narrow strait, while Saint Michael's Island is separated from the mainland by a narrow gut of only a few rods in width, and of such slight depth that in October, when the lowest tides occur, it is dry at low water. The coast on the northern side of the sound has an east and west trend; the extreme portions only being deeply indented to form Norton Bay and Golovin Sound at the eastern end, and Clarence Sound on the western extremity. The only islands worthy of mention on this stretch of coast are Áziak or Sledge Island, and Okévŭk or King's Island, the latter situated at some distance from the mainland, the line of the coast being rather abrupt and having but a narrow strip of low land before the foothills of the Kavyáyŭk Peninsula The region embracing the Yukon Delta is very low, only occasional hills, and these rarely touching the sea, to relieve the monotony of the area. Several streams of moderate size are to be found between Saint Michael's and the Yukon. The delta itself comprises numerous streams of variable size, and these constantly changing by the force of the ice brought down by the spring freshets, which plows away entire islands, and blocks channels and forms others among the yielding alluvium, while back from the sea-shore the flat land is infinitely intersected with sluggish streams, none of which contain water only during the wet season. These streams and the land in that vicinity are frequently overflowed by the high tides of December. The ice frozen to the soil is lifted by the waters, and in rising carry tons and tons of earth from the bottoms of the creeks and deposit it beyond the banks. When the spring opens large masses of fresh earth are often met with, carried out in this manner. I observed a single deposit of this kind over 500 feet long, about 30 feet wide, and averaging 2 feet deep, thrown out of the "canal" between Saint Michael's Island and the mainland, and this led me to account for the numerous little knolls of earth in the neighborhood. They may be detected also by the ranker growth of grasses which are found on them.

Between the Yukon Delta and Cape Rumiantzof the coast line extends northeast and southwest. It is indented by numerous, shallow bays and low, narrow capes. Many streams, some of

considerable size, drain the vast, extremely depressed, area between the Yukon and Kuskokvim Rivers. The coast line between the Kuskokvim River and Aliaska is partly low in the northern, and rugged in the central part, with alternating low and high stretches on the southern part. This extent is much broken by broad bays of water, several large streams, and the large rivers, Nushagák, Kvíchŭk, and Ugásik. At varying distances along the entire coast line broken ranges of mountains appear, their general direction being east and west for the southern part, and north and south for the northern part. The character of the interior is not known, except along the larger rivers, and that being of generally the same character as the coast. The peninsula of Aliaska is simply a continuation of the Alaskan Mountains, forming a comparatively long, narrow strip of land, extending nearly northeast and southwest. It is very mountainous, much broken into short ranges, usually several peaks on a wide base, or else isolated mountains often of great height, the portion of those over 2,800 feet high being destitute of vegetation. These mountains are quite abrupt on the southern side, and have numerous bays, coves, and arms of the sea thrust among them, even to their bases. The northern shore of the peninsula of Aliaska is a low, varied strip of land, a few miles to a few rods in width, the eastern end of the north side being generally wider and of less elevation, somewhat approaching the general characters of the tundras of the Yukon District.

The Aleutian Islands are but an interrupted continuation of the Aliaskan Peninsula. They extend in an easterly and western direction for a little over 1,000 miles; the central islands being farther south give the chain a nearly regular curve. Including the Commander Islands, the chain has its ends terminating nearly in the same degree (55°) of latitude, and the southernmost islands lying in about 51° 26′ north. The principal islands of the chain have their longer axis nearly in the same direction as that of the decurvature of the entire chain, the shorter axis lying to the eastward of north. The islands in the central part present a slight exception to these directions. These islands are, generally speaking, very mountainous (among them several active volcanoes, some of them very high), their sides generally abrupt, containing innumerable indentations, such as deep bays and coves—these more abundant on the northern and eastern sides than on the southern and western. (Nearly all the anchorages, and the villages, with few exceptions, are on the north and east sides of the islands.) There is but little level ground on any of the islands, that little being formed at the entrance to the larger valleys flanked by high mountains on either side, from which descend innumerable small streams from the summits of the mountains crowned, in most instances, with eternal snows. These streams unite to form creeks of slight depth and width, having a short course before they reach the sea. Lakes of variable size are to be found on nearly all the islands, some of quite large area being situated on the higher hills. The hardness of the rocks and the slight degree by which they are held in solution, renders the water flowing over them remarkably pure and of excellence for drinking purposes. I much doubt if water from any part of the globe makes better tea.

SOIL.

The greater portion of the coast line is bound with trachyte, porphyrite, syenite, and lava The hardness of the rocks has produced a meager soil, though in some localities it is sandy and in others a few isolated beds of clay occur. Near the mouths of the larger rivers great deposits of alluvial matter are to be found, generally formed of fine sand and decomposed vegetable matter. The depths of soil vary in each locality, and in the areas less favorably situated for drainage the soil remains frozen at a depth of less than 18 inches from the surface. The stratum of frozen soil varies from 3 feet to an unknown depth. I have seen several holes dug for various purposes and in apparently well-drained situations, and have in each instance, on the hill on which is situated the redoubt of Saint Michael's, found the continually frozen soil to be at a depth of less than 3 feet from the surface. In localities which are well drained the layer of frozen soil may even disappear during the latter part of summer, and in some places among the alluvial deposits it thaws out early in July. Among the Aleutian Islands the soil is frozen only during protracted periods of cold. The constant rains speedily thaw out the ground, which is in most places but a thin sod of a few inches to 2 or 3 feet, resting on a bed of gravel formed ages ago, and gradually encroached

upon and matted together by the roots of grasses which thrive on the lower lands, and which having fulfilled all the requirements of nature, are prostrated to the earth, not to rapidly decay, but even for years to remain and help bind the few particles of soil together lest it falls between the interstices of the gravel bed below. In the Yukon District it is almost impossible to find pure soil; the particles on being dried and separated reveal undecomposed vegetable fibers, and disintegrated volcanic scoriæ. This character of soil made it necessary that we should frequently moisten our garden-beds at Saint Michael's lest they blow away.

VEGETATION.

The scanty growth of plants, other than mosses, is due to the great accumulations of sphagnum, which, in the localities favorable for its growth, reaches a depth of 6 to 80 inches in the extremely depressed areas, and forming a covering, which, by its non-conductivity of heat, prevents the warm rays of the sun from penetrating to the frozen stratum below. Drainage being imperfect is a principal cause of the constantly frozen ground. Water remains in certain localities of extended area for ages, while at the bottom is in most instances to be found a thin deposit of mud resting on either frozen soil or pure ice. In walking over the low tracts I have frequently felt the ground undulate beneath me like a sheet of thin ice when walked upon. Frequent, small rounded holes were found of only a few inches in diameter. Into these holes I have often stepped and gone down to a depth of over 2 feet, and prevented from going farther by the hole being too small to admit my body. Having one day shot a duck, which mysteriously disappeared, I went to the edge of the pond and looked for the bird. I then thrust a long stick under the edge of the sod resting on the water of the pond, and could feel with but little interference from grass-roots far in under, yet the water was too deep for me to touch the bottom of the pond. I now saw that the margins of the ponds were being gradually encroached upon by the matting of the grasses, which in the course of time would entirely cover the surface, and in their turn be succeeded by a growth of sphagnum, which by its retention of cold would prevent the ice formed in the water below from being thawed out, and by the accumulation of vegetable matter on its surface decrease the power of the summer's sun to melt the frozen lake for more than a few inches of its depth. These lakes of ice have been the source of the ice bluffs presented on various parts of the coast, especially north of Bering Strait, the accumulation of soil on them producing the wonderfully attractive masses of plants and flowers spoken of by Arctic voyagers.

Another cause that may influence the speedy freezing, and consequent non-thawing of the coast line and moorlands is the fact that the annual snow-fall is probably only half as much or a third less than in the interior, comparatively adjacent. The greater part of the snow which falls on the coast is immediately drifted either into the sea or else far inland. It is rare that a depth of more than 18 inches of snow is found on the low level coast lands. Scarcely a day from November to April passes but that the snow is drifted. The ravines, gullies, and abrupt hillsides are the first to fill up, and by the middle of December the general character of the snow-sheet is level, only interrupted by bluffs and steep hillsides. Those places where the snow collects into the deeper drifts are found to be the scene of the more luxuriant vegetation in spring.

With these facts it would seem incredible that flowers should appear in this apparently bleak and desolate region.

The mantle of snow has scarcely disappeared in spring than the whole surface of the earth is awakened, numerous plants flourishing under such circumstances, existing, it would seem, independent of terrestrial heat, and in the course of a few weeks surprise is changed into wonder at the luxuriance and beauty of the vegetation, equaled only in more favored climes. With the sun above the horizon throughout the twenty-four hours the growth of plants is rapid in the extreme. The snow has hardly disappeared before the tiny but hardy *Dodecatheon* has in twelve days from its birth passed through the successive stages of growth, flowering, and the formation of its fruit. The *Pediculares* in a short ten days have shot up several inches, and though the leaves are not yet formed, the brighter pink raceme is full of bursting flowers. By the middle of July (and the snow sometimes continues falling to the middle of June) epilobiums, anemones, asters, ranunculuses, and dozens of gaudily colored plants enliven and variegate the earth. During the long Arctic days the plants have their period of sleep, short, though as plainly marked as in the tropics.

This time of rest is indicated by the drooping of the leaves and folding of the corollas and other signs which are observed in milder climes. Each species of plant requires a certain amount of heat, light, and moisture to fulfil the required conditions of life. Of light and moisture there is sufficient in the higher latitudes; the deficiency of heat may be supplemented by certain changes in the plant without losing their individuality, and may be changed to meet the requirements necessary for their existence in this latitude. The colors of the flowers are usually most intense; shades of blue and red prevail, the leaves are thicker or more fleshy and contain less woody fiber. The stems of many of the flowering plants attain their full height before the leaves and branches are half developed; and, in many instances, the flowers appear before the leaves, thus showing that in the struggle for existence the leaves and other parts of the plants have remained subservient to the fruit-producing portions. In many perennials the roots attain larger size than in warmer latitudes, and thus seem to store up an energy which not only adapts the plant to withstand the rigors of the climate, but forms a store from which to draw vitality in the early spring. The shrubby plants growing near the coast are peculiar for their change of growth by which they are enabled to lie nearer the ground and thus receive a greater amount of heat and also to be the better protected by the mantle of snow. The thickets of alder and willow are extremely tangled, the stems forming infinite curves and elbows, interlaced and matted together in such degree that progress is not possible among them. These shrubs in the most favorable localities attain a height of but feet feet, while their manner of growth and numerous abortive leaf-buds indicate their struggle for existence.

The willows and alders and dwarf birches alone attain a moderate height in the immediate vicinity of Saint Michael's. About 20 miles from the coast line, and just beyond the low hills which are near the sea shore, a scanty growth of poplars may be found in the protected ravines. These trees rarely reach a diameter of over 8 inches, and are generally decayed within. On the portage from Unalakhlit to the Yukon River a few spruce and poplars attain a height of 25 feet. Not until the watershed of the Yukon is reached do we find trees of considerable size; there spruce, willow, poplars, and birch obtain good size, and form the supply from which all the wood of the district is obtained. An incalculable quantity is brought down as drift each spring, and, thrown on the broad ocean, is distributed by tides, currents, and winds over the shores of all the islands and mainland bordering Bering Sea. Not until the shore of the inner part of Bristol Bay is reached do we find spruce growing immediately on the coast. On Aliaska trees are only found on its extreme eastern limits, and then mostly on the southern side. The willows and alders grow to a greater size on the western part of Aliaska than on the Aleutian Islands. The eastern part of Kadiak Island and those lying to the northeast of it are abundantly supplied with spruce and other trees. Of late years many cords of wood are exported from Kadiak to the Aleutian Islands for fuel.

Among the Aleutian Islands the only trees are the spruce from Sitka, set out by the priest of the Unalashkan district in 1832, on the island of Amaknák, a few hundred yards from the village of Iliuliuk, on Unalashka Island. The trees grew, some died, and now but fourteen remain; the other eight were either broken down or died. They have not reproduced their kind, though an abundant crop of cones is produced. Alders and willows are the only large shrubs found on the Aleutian Islands. Their growth is scarcely superior to that of the same species at Saint Michael. Even though drift-wood is scarce and cord-wood is dear, the Aleuts prefer to burn a few wisps of grass or a bunch of *Empetrum* rather than go the same distance for the alder or willow. Though it is true that among these islands the *Empetrum* attains its rankest growth, the entire hillside is covered with it, and the grasses contend in height with the willows.

PART II.—METEOROLOGY.

ABSTRACTS FROM THE DAILY JOURNAL AT SAINT MICHAEL, ALASKA.

JULY, 1874.

July 1: A strong gale from the south, attaining a maximum velocity of 55 miles.—July 7: The temperature has been slowly increasing for the past several days and is now quite pleasant.—July 9: Light rains in early a. m., and beautiful rosy sunset.—July 11: Light to gentle rains.—July 12: Light to gentle rains.—July 14: Light rain in a. m.—July 16: Hard shower of large drops of rain.—July 17: Hard showers of rain.—July 18: Hard showers of rain.—July 21: Maximum temperature of the season was reached to-day; 65°.—July 24: Maximum temperature of 70° was reached to-day; three distinct peals of thunder from a cloud in the southwest; no lightning observed.—July 26: Showery in a. m. and early p. m.—July 27: Drizzling rains all day.—July 29: Showery at intervals.—July 30: Light rains ending in mist.—July 31: Light rains at time.

AUGUST, 1874.

August 1: Heavy falls of rain; showers in the distance.—August 2: Rain in the distance.—August 3: Rain late in p. m.—August 4: Hard rain to-day.—August 5: Hard gale from the south toward noon; rain at intervals.—August 6: Light showers of rain.—August 7: A light gale blowing at 2 p. m.; light misty rain.—August 8: A light rain in a. m.—August 11: Frequent light showers; hard gale from the south after noon.—August 12: Strong gale from the south by 2 p. m.; light rain in p. m.—August 13: Showery at intervals.—August 14: Beautiful bands of cirro-cumulus clouds having their texture disposed in waves and fibers in all directions.—August 18: Fog and mist in late p. m.—August 19: Showers of light character.—August 21: Light gale from the north.—August 22: A sharp hail-storm at 3.24 p. m. with rain, lasting until 3.42 p. m.—August 23: Red glare on the clouds as the sun neared the horizon; a red and yellowish rain-bow appeared, accompanied by a second, which lasted but a few minutes.—August 27: A very slight rain in late p. m.—August 28: Foggy in early a. m.—August 31: Foggy in early a. m; a light rain in early p. m.

SEPTEMBER, 1874.

September 2: Heavy rain in p. m.—September 3: Frequent showers during day.—September 7: Hard rain in a. m. and light mistiness in p. m.—September 10: Aurora began at 9.09 p. m., lasting until 0.25 a. m. of September 11; it began as a single arch low down, a second arch at an elevation of 20 degrees formed soon after; a third arch appeared after a few minutes at an elevation of 40 degrees; the ends of the three arches coalesced at their eastern parts and slowly vanished, to form again as the first arch, only more bright in color, from which beams shot up to form an arch at 60 degrees elevation; between these two arches slender beams constantly played; one long beam touched the eastern end of the two arches and rapidly swept their entire length, and disappeared beneath the western horizon; after this beam had disappeared the auroral arch subsided into a state of passiveness, which gradually faded into an auroral haze.—September 11: The auroral haze of yesterday lasted only twenty-five minutes after the beginning of the day.—September 12: An aurora similar to the one witnessed on the 10th instant was observed this evening; the color was a yellowish-green.—September 13: Very dry to-day; the cistern of the hygrometer had to be filled twice; the lowest humidity was at 12 m., showing only 35.9 per cent. of moisture in the atmosphere.—September 14: A very light frost was observed this morning.—September 15: A dense fog in the day; a light frost in the early a. m.—September 17: Showery during the day.—September 27: Light spit of snow during the night.—September 28: Light gale from the northeast; beautiful display of cirri clouds at 7 a. m.

OCTOBER, 1874.

October 1: Snow fell heavily about 18 miles east of here.—October 2: Few flakes of snow fell at 9 p. m.—October 4: An aurora consisting of three well defined arches with numerous streamers moving from east to west lasted until 4 a. m. of October 5.—October 5: The aurora of yesterday evening lasted until 4 a. m. to-day; but little disturbance was shown.—October 8: A light snow-fall to-day.—October 12: A light spit of snow in the late p. m.—October 13: Several fluffs of snow fell at intervals.—October 14: Light snow at times.—October 15: Rather heavy snow-fall during the day.—October 17: Beautiful golden sunrise.—October 18: Hard snow-storm in p. m.—October 19: Spits of snow fell during the day; some small pieces of floating ice were seen in the bay.—October 20: Snow fell quite rapidly

to-day.—October 21: A light gale from the south.—October 23: A light gale increasing to a storm rate prevailed to-day; snow and rain fell nearly all day.—October 24: A strong gale from the southeast; showers of rain, changed to mistiness in late p. m.—October 25: Strong storm from the south, increasing to 87 miles per hour at 7 a. m; moderated after noon; rain fell in a. m.—October 26: Very high tide to-day caused by the south wind of the 25th.—October 27: Strong storm of wind from the south; severe showers of rain in p. m. and mistiness in a. m.—October 29: Very heavy fall of snow.—October 30: Much snow fell to-day.—October 31: Light spit of snow to-day.

NOVEMBER, 1874.

November 2: Snow melted slightly to-day.—November 4: Snow fell lightly to-day.—November 6: Snow fell lightly; large pieces of ice have been observed floating in the bay; a pale auroral arch of yellowish color was seen this evening.—November 7: A light gale from the south; heavy fall of snow occurred.—November 8: A brisk gale from the northeast in p. m.; a pale parhelion was observed at 1.45 p. m.—November 9: A fearful gale from the northeast increasing to the strongest storm rate.—November 10: Wind northeast to south, high to a gale rate.—November 11: Gale from the south; light fall of snow; some thaw in exposed places.—November 12: Strong gale from the south; a few drops of rain fell in p. m.—November 13: Gale of wind from the south.—November 14: Moderate gale blowing from the northeast.—November 15: Stronger gale from the northeast; lighter gale from the south.—November 16: Strong gale from the south; beautiful red sunrise.—November 17: Gale from the south early in a. m.; ice in the bay rapidly breaking up and going out to sea.—November 18: A light gale in the middle of the p. m., increased to a strong gale; light snowfall to-day.—November 19: Very high barometer (30.793) to-day.—November 20: Ice in the bay coalesced during the night.—November 21: A light gale from the northeast; ice in the bay is breaking into slush.—November 23: A gale blowing from the northeast all day; a pale aurora was seen in the early evening; the bright moonlight prevented it being readily seen.—November 24: A light gale from the northeast.—November 29: A few irregular flashes of auroral light were seen this evening.—November 30: Beautiful red sunrise; a pale aurora was observed at 10.20 p. m.

DECEMBER, 1874.

December 1: Decrease of temperature caused great deposits of frost spiculæ on the hairs, feathers, and nail-heads.—December 2: A moderate fall of snow in a. m.—December 4: A parhelion was observed at 1.45 p. m.—December 5: A gale blowing from the east.—December 6: A strong gale from the northeast in p. m.; a faint auroral glow was observed from 5 to 10 p. m.—December 7: A strong gale from the south in p. m.; large masses of snow fell.—December 8: A slight auroral display was observed at 9.30 p. m.—December 9: Strong gale from the northeast deep fiery-red sunset.—December 14: High gale from the northeast; a magnificent auroral display of five perfect arches, commencing as pale, fitful streaks and gradually assuming arches; held this position with little disturbance until 4 a. m. of December 15.—December 15: A strong gusty gale from the northeast; the aurora observed yesterday continued until 4 a. m. to-day; a second aurora, consisting of the same number of arches and relative position in the heavens, was seen from 5.30 p. m. to 11.30 p. m. of to-day.—December 16: Few flakes of snow; lunar corona of fine coloration when the clouds pass the face of the moon.—December 17: Brilliant parhelia in p. m.; the one to the left south of the sun had about 30 degrees of the parhelic circle well developed.—December 18: Magnificent displays of cirri clouds.—December 19: High storm of wind from the northeast; very gusty.—December 20: Wet snow fell during the night; a beautiful lunar corona at 9.30 p. m.—December 21: Great quantities of frost spiculæ were formed; snow fell in small amounts.—December 22: Snow fell in considerable amount.—December 23: A strong storm from the south during day; a light amount of snow fell.—December 24: A strong hurricane from the south; maximum velocity recorded was 89 miles per hour; the ice in the bay was thrown in huge blocks upon the shore; the tide rose the highest it has been known for years; a light rain fell at times.—December 25: High to a low gale from the south; heavy fall of snow.—December 27: A fearful hurricane prevailed, attaining a rate of 94 miles per hour at 5.24 p. m.; the snow was whirled in blinding drifts.—December 28: Low gale of wind from S. to NW.—December 31: Beautiful sunrise; an aurora of slight intensity was observed this evening,

JANUARY, 1875.

January 1: Gale from the northeast; a slight tinge of an aurora at 5.25 p. m., lasting until 1.45 a. m. of January 2.—January 2: Strong gale from the east, increasing to a storm rate; aurora of yesterday evening disappeared at 1.45 a. m. to-day.—January 3: Brisk gale from the northeast; finely developed twilight curve this evening.—January 7: Moderate snow-fall from 3 a. m. to 3.20 p. m.—January 9: High gale during latter part of the day; light amounts of snow fell.—January 10: Strong gale from the northeast in early a. m.; a magnificent rain-bow this a. m.; the colors were the brightest I ever witnessed; three bows were developed.—January 11: Strong gale from the east and southeast; rain and sleet fell in light quantities.—January 12: Beautiful sunrise of gold and red.—January 14: A magnificent sunrise of bright flame-color, the clouds having distorted edges of lighter color.—January 16: Beautiful display of upper clouds.—January 17: Dense fog covered everything with spiculæ of frost.—January 18: A fog-bank passed by at 2 p. m., covering everything with frost crystals.—January 19: Beautiful lunar corona of vivid prismatic colors this evening, caused by the white stratus clouds passing the moon's disk.—January 20: Faint lunar halo at 9 p. m.—January 21: High winds caused much light snow to be drifted into the air and caused the production of a halo of 22 degrees, the lower part of which was cut off by the earth; the sun is too low all to be represented; the ends could be seen between the hills and myself; the upper side of the halo was also cut off as the particles of drifting snow were not at times carried high enough into the air to produce a complete circle above the sun.—January

22: Solar halo partially visible in early a. m.—January 23: This morning, as the sun rose, a bright perihelion with 10 degrees of the parhelic circle was formed; at the moment of greatest brightness the sun appeared double like a figure 8 somewhat appressed, the lower was the true sun, while the upper was the mock sun; the temperature has been as low as —32° in the past twenty-four hours.—January 24: The temperature went as low as —37° to-day.—January 25: A high gale from the northeast increased to a storm rate from the south; much snow drifted during the day.—January 26: Strong gusty storm from the south; much drifting snow.—January 27: Strong gale from the east and southeast; a slight drizzle of rain in p. m.—January 28: Strong gale from SE. to S.; beautiful display of upper clouds.—January 29: Gale of variable rate from S. to SW.—January 30: Strong gale from the south.—January 31: Strong gale from the northeast; beautiful red sunset.

FEBRUARY, 1875.

February 1: High northeast gale.; a most extravagant display of upper clouds until 2 p. m.; snow fell at 4 p. m. of light character.—February 2: Much drifting snow from the high winds.—February 3: Light gale from the south.—February 4: Very light gale from NE. to E.—February 5: Gale of light character from the northeast.—February 6: A strong gale from the northeast; an aurora began at 9.35 p. m., appearing soon after like heavy drapery moved by a high wind.—February 7: A light gale rate of wind prevailed at times; eleven bright bands of cirri haze appeared when the sun was within 3 degrees of setting; they were 35 degrees high, and apparently convergent opposite the sun.—February 8: A strong gale from the south.—February 9: A moderate gale blew from the northeast and east.—February 10: A furious gale in p. m. from the south; frequent spits of snow.—February 12: A brisk gale from the northeast.—February 13: To-day was so warm and pleasant that a fly ventured out in my room.—February 14: A light gale from the east; a pale lunar halo at 6 p. m.—February 15: A strong gale from the southeast.—February 16: A light gale from the northeast; few flakes of snow fell; a halo and bright corona around the moon at 8.15 p. m.—February 17: Strong gale from SE. to SW.; few flakes of snow fell; lunar corona and halo this evening.—February 18: Frost spiculæ in moderate quantities formed on different objects to-day.—February 19: A light gale from the northeast drifted much falling snow.—February 20: A strong gale from the northeast; much snow was drifted.—February 21: Much drifting of snow from the light gale of wind from the northeast.—February 22: Gusty gale from the northeast; snow drifted furiously.—February 23: Gale to a storm rate of wind from the south. Snow fell in p. m., but was drifted.—February 24: Snow fell, but was drifted.—February 25: A variable gale from NE. to E.—February 26: Strong storm of wind from N. to NE.; an aurora was visible at 7 p. m., beginning as a low thin, pale yellowish arch, broken in the center; these ends soon united, and from which three other arches appeared and extended across the heavens for 35 degrees south of the zenith, and about the same distance north of the zenith; the center was somewhat broken, the brightest part being near 30 degrees from the center; at 7.35 p. m. the southern arch disappeared, the band intersecting the zenith had much faded; the one at about 63 degrees elevation had also decreased in brilliancy; the decrease of intensity of those three arches seemed to augment the power of the lower arch; at the same time the dark segment appeared well defined; at 9 p. m. the remaining arch began to send up streamers which, faint at first, soon became very brilliant and gathered in the zenith (really slightly east of it about 11 degrees) to form a magnificent corona with east and west extensions; the cupola broke at 9.40 p. m., forming a long arch with its center in the zenith; this arch was of a bright sulphur-yellow; a few minutes elapsed and the arch was broken into disconnected beams which rapidly vanished, so that by 1.30 a. m. of February 27 it had completely disappeared.—February 27: Strong gale from the north in the early part of the a. m; a slight trace of yesterday evening's aurora was visible this morning early; a pale aurora was observed this evening at 9.15 p. m.—February 28: Considerable vertical mirage this morning; a pale aurora from 8.20 p. m. to-day lasted until 3 a. m. of March 1.

MARCH, 1875.

March 1: Strong gusty gale from the north and northeast, a pale ill-defined aurora from 9.30 p. m. to 10.40 p. m.—March 2: Beautiful twilight curve this evening; a pale aurora of a single arch from 7.25 p. m. to 11.40 p. m.—March 3: Aurora of a single arch was visible from 10.15 p. m. until 3.25 a. m. of March 4.—March 4: The aurora of yesterday evening continued until 3.25 a. m. to-day.—March 6: A pale aurora at 8.15 p. m. consisting of ill-defined fragments with few "dancers" on the eastern extremity.—March 7: A pale aurora from 7.45 p. m. to 11.55 p. m. was obscured by clouds.—March 8: A low storm of wind blew gustily from E. to NE.—March 9: A hard wind-storm blew from various points of the compass.—March 10: A gusty gale to a high storm rate of wind from the south and southwest; maximum velocity of 71 miles per hour was registered at 1.30 p. m. little more fell and some melted in exposed places.—March 11: A high, gusty gale from the south, large flakes of snow fell plentifully, but was drifted.—March 12: Much gustiness of wind; air full of frost-films; two halos, one of 22 degrees and one of 46 degrees, formed round the sun; parhelia formed on the inner halo.—March 14: Gusty gale from the northeast; fantastic arrangements of upper clouds prevailed to-day.—March 15: A brisk gale from the northeast; snow fell at a distance.—March 16: A high gale rate of wind prevailed from the northeast.—March 17: Much snow fell to-day, drifting furiously.—March 18: Gusty gale from N. to W.; snow fell in abundance, but was drifted.—March 19: A moderate gale of wind from the north; air full of frozen vapor, making a faint parhelion; at sunset a faint arc of a halo of 22 degrees was observed; a single arch of an aurora was seen from 10.15 p. m. to 11.45 p. m. when it was obscured by clouds.—March 21: A perfect halo of 22 degrees was formed around the sun at 2 p. m.—March 22: Considerable mirage from 7 to 8 a. m.—March 23: A strong storm rate of wind from the west; the ice in the sea at the northeast point of Saint Michael Island moved out to-day.—March 24: A strong storm of wind prevailed from the northeast; much snow drifted.—March 25: A strong gale from the north in the early part of the day; much snow drifted; a halo of 22 degrees

and of 46 degrees formed around the sun; as the sun sank beneath the horizon a conical beam shot up for 7 degrees and 3 degrees wide at the horizon, changed to a single vertical beam of 12 degrees high as the sun further disappeared.—March 26: Variably light to a strong gale rate at intervals prevailed from S. to SW.; at 1.45 p. m. a splendid arrangement of halos of 22 degrees and 46 degrees with parhelia at the intersection with the partially formed parhelic circle was interrupted with broken stratus.—March 27: An aurora of a poorly defined arch with few "dancers" and flashes lasted from 8.40 p. m. to 3.45 a. m. of March 28.—March 28: The aurora of yesterday evening lasted until 3.45 a. m. of to-day; an aurora of feeble intensity began at 8.20 p. m., disappearing at 11.20 p. m.—March 30: A high gale prevailed early in the day from the south; fine snow was drifted from the sky for the greater part of the day; a halo of 22 degrees and one of 46 degrees formed round the sun; parhelia formed on the halo of 22 degrees; a pale aurora of a single arch from 8.30 p. m. to 3.35 a. m. of March 31.—March 31: An aurora, the continuation of the one seen March 30, lasted until 3.35 a. m. of to-day; during this month so much snow has drfted that measurements have not been at all times possible.

APRIL, 1875.

April 1: A hurricane blowing from the south; much snow flying in the air.—April 2: A hurricane from the south, blowing at a rate of 86 miles at times; ice in the sea breaking up.—April 3: A hurricane rate of wind from the south, blowing 86 miles per hour at its maximum; snow on the ground nearly gone; much ice in the sea has moved out.—April 4: A stormy gale from the south; much snow fell and drifted.—April 5: A high gale early in a. m. from the south; much snow fell and drifted.—April 6: Gusty gale rate of wind from N. to NE.; an aurora was visible from 9 p. m. to 3.10 a. m. of April 7; no arch was formed; a grand display of streamers and beams taking the form of drapery moved by the wind.—April 7: Aurora of yesterday evening continued until 3.10 a. m. of to-day; an aurora similar to the one recorded yesterday was seen this evening from 9 p. m. to 2.25 a. m. of April 8; it had a horse-shoe form and constantly waved back and forth, subsiding to a haze and reappearing.—April 9: Aurora of April 8 disappeared at 2.25 a. m.; an aurora of slight intensity was observed from 10.10 p. m. to 11.42 p. m.—April 13: A low gale rate of wind from various quarters; a light spit of snow.—April 15: Much frost in the air.—April 16: A strong gale from the southwest.—April 17: A light gale from S. to SW.; large flakes of snow fell.—April 18: A light fog in the evening; much frostiness in the air.—April 19: Fogginess all the early a. m; considerable thaw to-day.—April 24: Large flakes of snow fell irregularly.—April 25: Little snow fell in large flakes.—April 26: A dense fog in early a. m.; a light gale from the north toward noon; much thawing; pale solar halo.—April 27: Hard storm of wind from the north and northeast; snow fell in light amounts.—April 28: A light gale from the east and northeast; beautiful display of upper clouds.—April 29: Snow rapidly melting; quite warm to-day; swans (*Olor columbianus*) arrived to-day.—April 30: A strong gale from NE. to E.

MAY, 1875.

May 1: A gusty gale from the northeast, at times attaining a storm rate.—May 2: A storm rate of wind from the northeast.—May 3: A low storm of wind at noon.—May 4: A gale rate of wind from the northeast; at 5.24 p. m. a bright halo of 22 degrees having brilliant parhelia at the intersection of the parhelic circle and a very bright parhelion at the intersection of the vertical beam.—May 5: Solar halo of 22 degrees attended by brighter parhelia in the early p. m.—May 8: Some of the larger water-fowl arrived this week.—May 10: Fog during the early p. m.—May 16: Several species of land birds have arrived; the unfavorable weather has been much against their coming.—May 17: Little snow to-day.—May 18: Half an inch of snow fell during the day.—May 19: Considerable snow fell during the night.—May 21: A heavy fall of snow in early a. m.—May 23: A few radishes, lettuce, and cabbages growing finely in the hot-bed.—May 27: Dense fog in late p. m.—May 28: Dense fog prevailed.—May 29: Several additional birds arrived this week, among them were snipe and a blackbird; a light gale prevailed early in a. m. from the south.—May 30: Light gale from the south.—May 31: A light gale from the southwest.

JUNE, 1875.

June 1: Ice has again accumulated to seaward.—June 2: Several lepidopters flying around to-day.—June 3: Grass and few flowering plants are beginning to show above ground.—June 4: A strong gale from N. to S. via E. blowing.—June 5: Warm and pleasant.—June 7: Several light showers of rain.—June 8: Rain of light to moderate character all day.—June 9: Light rain during day; fog prevailed at times.—June 10: Fog at times.—June 12: Ice in the bay breaking into small pieces; a light frost last night; few flowers in blossom.—June 14: Two vessels reported in night as being far out to sea; they came through the broken ice by evening.—June 15: A moderate gale from the south and sothwest took out the ice in the bay; also the two vessels, which sustained no harm; a severe thunder-storm occurred in the early p. m.—June 16: Attempts to reach the vessels were frustrated by the pack-ice.—June 18: Strong gale from the east and southeast.—June 19: Very gusty wind to-day from SE. to S.; ice still jammed in the bay.—June 20: A hard storm of wind from the southeast; ice in the bay dashed to pieces by the waves and rapidly disappearing.—June 24: Rain fell of light character.—June 28: Strong gale from the south.

JULY, 1875.

July 8: Light shower of rain.—July 9: Light gale early in p. m.; rain of light character fell.—July 10: Strong gale from the southeast; light rain fell.—July 12: Very light rain-fall; strong gale from the south.—July 13: Strong gale; light rain-fall.—July 14: Light gale from the north.—July 15: Moderate rain-fall.—July 17: High gale from the southwest.—July 18: Strong gale from the northeast.—July 20: A strong gale from the south; hard rain-

fall.—July 25: Light gale from the north.—July 26: High gale from the northeast; fine twilight curve.—July 27: A gale of variable rate from the northeast; temperature 70° to-day.—July 28: Temperature 70° to-day.—July 30: Strong storm of wind from the south; hard rain late in p. m.—July 31: Gusty storm of wind from the south; much rain fell at intervals.

AUGUST, 1875.

August 2: A strong storm rate of wind from S. to SW.—August 3: Storm rate of wind, very gusty; rain fell in light quantity.—August 4: Moderate storm rate of wind from the south; heavy rain.—August 5: Heavy rain-fall.—August 7: High gale rate of wind from the south.—August 10: Several light showers of rain.—August 11: High gale from the south; light rain-fall.—August 12: Strong storm of wind from S. to SW; heavy rains in the distance.—August 13: A hard shower of rain in early p. m.—August 17: Light rain late in p. m.—August 18: Light rain in early a. m.—August 22: A light gale from S. to E.—August 24: A heavy dash of rain in a. m.—August 26: A light rain in p. m.—August 27: High gale from the east.—August 28: Strong hurricane from the south; a maximum velocity of 81 miles per hour was obtained; light rain fell.—August 29: A strong gale from the southwest and west; light rain-fall.

SEPTEMBER, 1875.

September 1: A high gale from the east; light rain in p. m.—September 2: Light rain in a. m.—September 3: Moderate rain-fall; a pale arch of an aurora was seen from 8.30 p. m., until 10 p. m., when clouds obscured.—September 5: Hard showers in p. m.—September 6: Hard rain in a. m.—September 7: Light rain in middle of day.—September 8: Strong gale from the southwest; bright aurora partially obscured by clouds.—September 10: Strong gale from S. to SW.—September 14: Light to high gales from the southeast.—September 15: Moderate gale from the southeast.—September 16: Strong storm of wind from S. to SW.—September 17: Brisk gale from SE. to E.—September 18: Rain of moderate character in p. m.—September 19: Moderate rain in a. m.—September 20: Fog in early a. m.—September 21: Fiery-red and gold sunset.—September 22: Light gale from the northeast; sea very rough.—September 23: Strong gale from NE. to E.—September 24: Gusty gales from the northeast; sea water very turbid.—September 25: Coppery red sunset.—September 27: Strong gale from the northeast; light rain in p. m.—September 29: Moderate rain-fall.

OCTOBER, 1875.

October 4: Aurora of a single arch visible from 6.30 p. m. to 2 a. m. of October 5.—October 5: Aurora of yesterday continued until 2 p. m; aurora visible this morning, consisting of three pale arches, lasting until midnight; high gale in p. m. northeast.—October 6: Strong storm from the northeast; aurora of a single arch from 8 p. m. until daylight of October 7.—October 7: Fearful surges of storm rate of winds from the northeast; brilliant sunset; thin films of ice on the shallow pools; aurora of October 6 continued without change until daylight.—October 8: high gale rate of wind from the northeast; water in the bay very low; heavy ice on the fresh water.—October 9: High gale of wind from SE. to S.; snow fell in the distance.—October 11: Brilliant meteor in the southeast at 9.38 p. m.—October 13: High gale from the northeast.—October 14: Light rain in p. m.—October 15: Light rain in a. m.—October 16: Strong gale from the north.—October 17: High gale from the northeast; light snow-fall and sleet; water very low in the bay.—October 19: Heavy frost last night.—October 25: Few flakes of snow.—October 26: Spits of sleet and snow.—October 29: High to a strong gale from the south; snow fell, changing to rain, which froze fast as it fell; misty rain in late p. m.—October 30: Light gale from the southwest; snow and rain fell lightly; ice making in the sea next the shore.

NOVEMBER, 1875.

November 1: A high gale from the northeast auroral arch in the evening, partially obscured by clouds.—November 2: Aurora of yesterday continued until 4.50 a. m. to-day; auroral haze was observed at 10.30 p. m.—November 3: Auroral haze from 6.20 p. m. to 9 p. m.—November 4: Light gale from the southwest; ice forming quite heavily in the bay; snow fell, but was drifted.—November 5: Little snow and sleet fell in a. m; a pale auroral glow in late p. m.—November 6: Several sleet squalls of light character.—November 8: Lunar halo of 22 degrees in late p. m.—November 9: Fine snow fell in considerable quantity; high gale late in p. m.—November 11: Bright parhelia at 8.40 a. m; a well defined vertical beam also showed; the red color was very bright, changing to pale bluish at noon.—November 12: Light mirage.—November 13: Lunar halos of 22 and 46 degrees with parselenes at the intersections of the parselenic circle and vertical beam.—November 16: Considerable amounts of frost crystals.—November 17: Long spiculæ of frost attached to the grass.—November 18: Heavy fog; everything is bent to the ground under the weight of frost crystals; I have never before witnessed such a grand crystallization of moisture.—November 19: Much mirage.—November 20: Few flakes of snow.—November 22: Strong gale from the southwest; all the ice to the northeast of the island has moved out to seaward.—November 26: Moderate gale from the northeast.—November 29: Aurora began at 5.24 p. m., and continued all night, lasting until 5 a. m. of November 30.—November 30: Aurora continued until 5 a. m; a single auroral arch began at 9.30 p. m., continuing with little change until 5.30 a. m. of December 1.

DECEMBER, 1875.

December 1: Aurora of November 30 continued until 5.30 a. m. of to-day; aurora of feeble intensity from 9.50 p. m. to 4.35 a. m. of December 2; slight indications of an arch at midnight.—December 2: Parhelia having slight tails were seen to-day; aurora of December 2 continued until 4.35 a. m. to-day; an aurora, hardly recognizable, was

visible at 9.10 p. m.—December 3: Strong gale from the southwest; pale aurora at 9.30 p. m.—December 4: Faint auroral glow; much mirage.—December 9: Air full of frozen particles, forming parhelia and a doubling of the sun at 10.20 a. m. as it rose through the stratum of drifting snow; parselenes were formed in the evening; a complete parselenic circle with a circumzenithal external arc and the one below it were well defined.—December 10: Dazzling parhelia formed toward noon; parselenes and part of a parselenic circle were developed in the evening; much snow flying through the air.—December 11: Parhelia and parselenes formed to-day.—December 15: Much mirage to-day.—December 17: Pale aurora began at 9 p. m., lasting until 3.15 a. m. of December 18.—December 18: The aurora of yesterday evening continued until 3.15 a. m. of to-day; an ill-formed arch of an aurora began at 9 p. m., lasting until 11.45 p. m.—December 19: Pale auroral glow at 9 p. m.—December 20: High storm from the south; much snow drifted.—December 21: A moderate gale from the southwest; snow flying furiously.—December 24: High gusty gale from NE. to E.—December 25: A high gale from E. to NE.; much snow fell.—December 26: Very high tide.—December 27: Strong gale from the south.; high tide at 5.15 p. m; much ice moves off to seaward.—December 28: Strong gale from the southwest; snow drifted furiously.—December 29: Aurora at 10.15 p. m., lasted until 7.20 a. m. of December 30.—December 30: Aurora of yesterday lasted until 7.20 a. m. of to-day; an aurora of little intensity from 8.25 p. m. lasted until 7.15 a. m. of December 31.—December 31: Aurora of yesterday lasted until 7.15 a. m. of to-day; a second aurora of feeble intensity began at 10.35 p. m., and lasted until 7.35 a. m. of January 1, 1876. The auroras of December, 1875, have been remarkably low in intensity.

JANUARY, 1876.

January 1: Aurora visible at 1.59 a. m., lasting until 7.25 a. m., the continuation of the one seen yesterday evening; much mirage to-day.—January 2: Considerable mirage to-day.—January 3: Very gusty gale from the east by noon.—January 4: Strong gusty gale; much snow drifted.—January 5: Strong gusty gale from the southeast.—January 6: Very gusty gale from the southeast; snow fell.—January 7: High storm from the south; much snow drifted; ice began to move out this evening.—January 8: Much snow fell, some drifted.—January 9: Gusty gale from the south and southwest; snow drifted furiously.—January 10: Lunar fog bow with faint supernumerary; parhelia in p. m. with bright vertical beam.—January 11: Strong gale from the north; threatened rain.—January 12: Light gale from the east; snow during night.—January 14: Snow sifted from the sky.—January 15: Irregular gale from the south; much snow flying.—January 16: High storm from the south; snow drifted furiously.—January 17: Gusty gale from the south; sea-ice all gone excepting that in the bay.—January 18: High gale from the south; all the sea-ice gone, an occurrence rarely known at this season.—January 19: Hard gale from the southwest; much snow in large flakes fell.—January 20: Strong gale from the southwest.—January 22: Gusty gale from the south, increased to a high storm; indistinct auroral arch obscured by clouds this evening.—January 24: Hard gale from the north.—January 25: Gusty gale from the south; auroral arch at 7 a. m., lasting until 8.20 a. m.—January 26: Terrific gale from the south; very gusty.—January 27: Hard gale, with much flying snow.—January 28: Pale auroral arch from 1.59 a. m. to 7.15 a. m.—January 29: Pale aurora at 7 a. m.; auroral haze at 10.15 p. m., disappearing at 11.15 p. m.—January 30: Light gale from E. to NE.—January 31: Gusty gale from east; auroral arch at 7 a. m.; lasting until 8.10 a. m.; very bright display.

FEBRUARY, 1876.

February 3: Faint auroral arch from 7 a. m. to 7.45 a. m.—February 8: Brisk gale from northeast made the snow fly.—February 9: Gusty gale from N. to NE.; much snow flying.—February 13: Light gale from the north; auroral haze from 7 to 7.35 a. m.—February 15: Auroral haze from 8.30 p. m. to 10.15 a. m.—February 17: An aurora of moderate intensity, forming an arch from 8.35 p. m. to 8.10 a. m. of February 18.—February 18: The aurora of yesterday evening lasted until 8.10 a. m. to-day; aurora from 7.30 p. m. lasting until 7.45 a. m. of February 19; this aurora formed an arch, having slight disturbances on the eastern end.—February 19: Aurora of yesterday evening lasted until 7.45 a. m. of to-day; aurora of a single arch from 8.15 p. m. to midnight.—February 21: Bright parhelia and halo at noon.—February 22: Fog bow during the middle of the day.—February 23: Dark-edged halo of 22 degrees around sun.—February 24: Variable gale from the south; snow fell and much drifting occurred.—February 25: Snappy gale of variable rate from N. to NE.; a furious snow-storm prevailed.—February 26: Part of a halo and parhelia toward noon.

MARCH, 1876.

March 2: Gusty gale from the northeast; snow flying furiously.—March 3: Small lunar halo of 22 degrees in the evening.—March 4: Strong gusty gale from the northeast; considerable snow falling and drifting.—March 5: Considerable thaw.—March 6: Strong gale from E. to NE.; snow drifted; bright lunar halo of 22 degrees at midnight.—March 7: Hurricane gusts from SE. to S.; snow flying furiously.—March 8: Irregular gale rate from S. to E.; snow and rain fell in light character.—March 11: Snow flying furiously; gorgeous sunrise.—March 12: Snow fell and drifted.—March 14: Gusty gale from the southwest.—March 17: Gusty gale from the north.—March 18: Light gale from the north.—March 19: Light gale from N. to NE.—March 21: Much drifting snow.—March 25: Aurora of two arches, upper faint, appeared at 9.20 p. m., lasting until 1.30 a. m. of March 26.—March 26: Aurora of yesterday continued until 1.30 a. m. of to-day; a pale arch of an aurora visible from 10 p. m. to 4.30 a. m. of March 27.—March 27: The aurora of yesterday lasted until 4.30 a. m. of to-day; aurora this evening lasting from 9.40 p. m. to 11.15 p. m.—March 28: Auroral arch at 10 p. m., became very bright at 11 p. m., continuing until 4.35 a. m. of March 29.—March 29: Aurora of last night continued until 4.35 a. m. to-day.—March 31: Considerable fine snow sifted to-day.

APRIL, 1876.

April 1: Slight melting.—April 2: Melting in middle of day.—April 3: Much snow drifted to-day.—April 4: Snow melted greatly.—April 5: Light gale, and drifting snow from the southwest.—April 6: Considerable fog over the hills.—April 7: Mirage of slight intensity.—April 8: Much vertical mirage.—April 9: Considerable thaw to-day.—April 10: Light gale from the northeast.—April 11: Deposits of frost on everything.—April 13: Much thaw in middle of day.—April 15: Light snow in thin films fell.—April 17: Pale solar halo with parhelia.—April 18: Much melting of snow.—April 20: Gusty gale from NE. to E.; much thaw.—April 21: Light gale from E. to SE.—April 22: Several of the imperfectly migratory birds have become quite numerous, such as *Lagopus lagopus*, *Acanthis linaria*, and *Plectrophenax nivalis*; much melting of the snow brings these birds to the coast.—April 23: Heavy fall of snow; traders report the snow of the interior to be rapidly melting.—April 24: Much fine snow fell.—April 25: Large flakes of snow fell abundantly.—April 26: Extremely heavy fall of large snow-flakes; I observed a chickadee on one of the houses.—April 27: Arrival of a trader, from the Kuskokvim River, who reports the appearance of geese and ducks in that vicinity.—April 30: Much snow having fallen in the past week has prevented migratory birds from appearing.

MAY, 1876.

May 1: A light gale from the north.—May 2: Much snow fell and drifted.—May 3: Strong gale from the north.—May 4: Arrival of a trader, who reports warm, spring-like weather at the Yukon delta, with an abundance of geese and ducks.—May 9: Arrival of the first geese.—May 13: Lowest barometer read 28.740 to day.—May 25: Snow has nearly all gone; ice in the bay and to seaward is nearly all gone.

JUNE, 1876.

June 9: Gusty gale from S. to SW.—June 11: Much ice returned to the bay.—June 12: Dense fog; whales, *Orca pacifica* (?), were seen in the large hole in the ice in the bay.—June 13: Light gale from the southwest; dense fog prevailed.—June 14: Dense fog; ice in the bay nearly gone.—June 16; Dense fog; several white whales, *Delphinapterus catodon*, were seen to-day; herring came at 6 a. m. to-day in great numbers.—June 17: Ice still remains in the vicinity.—June 18: Dense fog.—June 19: Light rain; dense fog in p. m; much ice, in the form of a belt, at sea.—June 20: Rain of light character; we planted garden-seeds May 28; the young vegetables look very promising.—June 21: Densest fog.—June 23: Traders from the head of the Yukon district arrived to-day.—June 24: Dense fog.—June 25: Arrival of a vessel from San Francisco; the remainder of the boats belonging to the different trading stations of this district arrived to-day.—June 28: Hard, dashing rain, accompanied by thunder and lightning; temperature rose to 75°; arrival of steamer St. Paul.—June 30: Hard rain, with thunder and lightning.

JULY, 1876.

July 1: Light rain; mist in middle of day.—July 2: Gusty gale from N. to NE.; heavy rain fell.—July 4: Light gale from SE. to S.; light shower of rain.—July 10: Very high tide at 8.40 a. m.—July 11: Dense fog.—July 14: Very gusty gale.—July 15: Light to moderate rain.—July 16: Gusty gale from the southeast.—July 17: Light gale from the southeast.—July 18: Strong gale from the south.—July 19: Hard, gusty gale from the south; light showers.—July 20: Gusty storm of wind and rain from S. to E.—July 21: Gusty gale from SE. to S.; intervals of light rain.—July 22: Light rains; the boats loaded for the distant stations of this district have been detained eleven days by the strong winds.—July 26: Light rain.—July 30: Rather hard rains.—July 31: Moderate rain at intervals.

AUGUST, 1876.

August 2: Rain of hard character.—August 3: Rain of light character.—August 4: Showery in p. m.—August 5: Hard dash of rain fell as snow on the hills.—August 6: Frost during the night.—August 10: Light rain.—August 11: Moderate rain.—August 12: Hard dash of rain.—August 13: Halo around sun.—August 14: Light rain; gusty gale from N. to NW.—August 17: Light rain.—August 18: Moderate rain.—August 19: Light rain; very high tide at 7.10 a. m.—August 20: Light to hard rain; very gusty from the southwest.—August 21: Misty rain; great numbers of migratory birds have departed within the past week; the list includes terns, sparrows, and swallows.—August 23: Heavy dew.—August 25: During the past ten days we have enjoyed an abundance of blue-berries, salmon-berries, and cow-berries, forming an agreeable addition to our plain fare.—August 27: Several boats arrived from the Yukon delta; the men report much rain during this month.—August 29: Dense fog in a. m.; bright display of aurora this evening, forming a complete veil over the northern heavens, notable for the rapid changes from one form to another; the aurora was so low that a dense cumulo stratus cloud was visible beyond the aurora at times.

SEPTEMBER, 1876.

September 1: Light rain in p. m.—September 2: Moderate rain in p. m.—September 3: Heavy showers in night.—September 4: Gusty gale from E. to S.; hard dashes of rain.—September 5: Gentle showers to moderate rain.—September 6: Moderate rain.—September 7: Light showers.—September 11: Light rain.—September 12: Fine display of upper clouds.—September 13: Surging gale from SE. to S.; very high tide.—September 14: Light gale from the southeast.—September 15: Heavy rain.—September 16: Light rain.—September 17: Very disagreeable and damp.—September 18: Light rains.—September 19: Drizzly rains; snow fell on the hills.—September 20: Light rains.—September 21: Light rain; heavy snow fell on the hills.—September 22: Moderate rain.—September 23: Few pellets

of sleet fell; sharp freeze; ice nearly half an inch thick on the fresh-water pools.—September 25: A faint auroral glow from 8 p. m. to 10 p. m.—September 26: Light spit of snow; brilliant aurora.—September 27: Light rains; aurora of yesterday continued until 4 a. m. of to-day.—September 28: Solar halo of 22 degrees; frost and ice.—September 30: Heavy snow fell to the eastward.

OCTOBER, 1876.

October 1: Solar and lunar halo.—October 2: Light gale from NE. to E.; moderate rain in p. m.—October 3: Heavy rain; high tide.—October 4: Light to moderate rain.—October 5: Fog in p. m.; large flock (about seventy-five individuals) of Sabine gulls (*Xema sabinii*) flew past this place and to the northward; this is a rare bird in this vicinity, and rarely more than one individual is seen at a time.—October 6: Densest fog; light spit of snow.—October 7: Rain of light character began late in night.—October 8: Moderate to hard rain; very low tide; water 15½ feet below mean tide.—October 10: Unusually brilliant aurora, greatly obscured by clouds; rain late in p. m.—October 11: Moderate rain.—October 15: Gusty gale from the north; faint aurora in evening.—October 16: Gusty gale from the north.—October 16: Two to three inches of ice on the lakes; ice has also formed where the sea-spray has dashed on the rocks of the beach.—October 18: Great numbers of large gulls (*Larus barrovianus* and *leucopterus*) have been seen to-day.—October 20: Brilliant aurora revealed through a rift in the clouds.—October 24: Several gulls of the species mentioned October 18 have been seen to-day.—October 26: Light spit of snow.—October 28: The gulls previously mentioned have been numerous to-day.—October 29: Ice beginning to form in the bay.—October 31: Ice formed on the bay so thick that a couple of people crossed on it.

NOVEMBER, 1876.

November 1: Strong gusty gale from S. to SE.; ice in the bay taken out by the wind; rain and sleet of light character.—November 4: Light gale from NW. to N.; snow fell heavily in the distance; ice in the bay forming rapidly.—November 5: Low gale from the north.—November 7: Strong gale from the south; a larger part of the ice was carried out; snow fell and drifted.—November 8: Snow late in p. m.—November 9: Misty, freezing to the grasses and weeds; ice again went out of the bay.—November 10: Misty, with intervals of snow-squalls.—November 12: Aurora began to show at 5.24 p. m. as a light haziness, which gradually became denser, forming an arch at 7.10 p. m., on which beams danced with incredible velocity from E. to W. and *vice versa*, with an irregular flapping up and down; the colors were pale greenish-yellow above and deep purple below; the center of the arch for its entire length was yellowish, with a margin of about 16 degrees in width of green to deepest yellow, while below, for about 25 degrees, the edging was blue, green, purple, red, and yellow at different times; when an intense wave would start from near the eastern end and rush rapidly along the arch all the colors listed above would shine vividly and in such quick succession that it was at times impossible to keep account of their changes; the dark segment was ill-defined; the display lasted until 11.50 p. m.—November 15: Pale aurora from 6.10 p. m. to 9.25 p. m.—November 16: Pale aurora from 6.20 p. m. to 10 p. m.—November 17: Pale aurora formed an arch, lasting from 5.50 to 11.10 p. m.; at 4.24 p. m. I was startled by two flashes of light, which, to a great degree, dimmed the flame of an argand burner on the lamp; I immediately ran to the window to look for fire, but seeing none, I rushed out of the house, and looking in the W. NW., *i. e.*, 23° N. of W., saw an irregular streak of fire perpendicular to the earth; below this was a second and a third below that; the first streak at an altitude of 28°, and was about 2°.5 long and 12′ wide, then at a space of 3° began the second or middle streak, having the same length and width as the upper; the third or lower was like the middle streak, excepting it was shorter and much brighter; all had the peculiar bright white light of the sun, not yellowish, like the moon; I immediately ran to tell Mr. Neumann, who lives in the next house; he was hunting his hat to come and tell me that he had seen it fall; he described it as descending slowly in a zigzag manner, as indicated by its path, and that it seemed to swell and shrink in size in falling; he described the size of the meteor to be about the size of the moon, and that the outlines were very irregular; we watched the light from 4.24 p. m. to 5 p. m., at which time the upper streak had faded out of sight; the middle streak had moved westward (nearly northward) 10 degrees and was now inclined to the horizon; the third or lower streak was also inclined to the horizon, and moving to the westward; the middle one had now taken the exact shape of the hull of a large vessel, and was plainly distinguishable as well-defined cirri streaks in daytime; the lower streak faded out at 5.35 p. m.; the middle or hull-shaped one lasted until 5.46 p. m., or a total time of one hour and twenty-two minutes; this meteor was witnessed by three white men, including myself; many natives also saw the meteor, and were greatly frightened.—November 18: Auroral haze in early evening, obscured by clouds.—November 20: Light spit of snow.—November 25: Pale halos and parselenes.—November 26: Air full of frozen vapor, making a pale halo and parhelia; a pale aurora from 7 to 7.25 a. m.; pale auroral arch at 6.25 p. m.—November 27: Aurora of yesterday evening continued until 7.30 a. m. to-day.—November 30: Lunar halo all night.

DECEMBER, 1876.

December 1: Much snow flying.—December 2: Cold, gusty gale from the north; snow flying; imperfect solar halo and parhelia.—December 7: Strong gale from the south; much drifting snow.—December 9: Snow fell and instantly drifted.—December 11: Strong gale from the northeast; snow drifted furiously; pale aurora from 5.10 to 8.10 p. m.—December 15: Air full of frost spiculæ; snow fell.—December 18: Faint auroral glow hidden by clouds.—December 20: Strong gusty gale from the south.—December 21: Strong gale from N. to NE.; Snow and rain fell, light in character.—December 26: Brilliant lunar coronæ.—December 27: Much mirage.—December 30: Air full of frost films.—December 31: Parhelia at noon.

JANUARY, 1877.

January 1: Terrible storm to a hurricane rate of wind from the north; snow drifted furiously; bright parhelia and parselenes.—January 2: Terrible storm rate of wind from the north; parhelia and parselenes.—January 3: Very high gale from the north; the arrival of traders from the Kuskokvim River was a pleasant surprise to-day; the traders report much rain and snow; hard rains near the winter solstice took off all the snow and made the river rise so high that many natives fled to the higher lands; the month of November, 1876, was very cold and caused much distress among the natives; along the Yukon delta was much snow and generally mild weather; fur-bearing animals are reported to be abundant; these traders express the severity of the wind and cold on the first of this month as being extreme.—January 5: Pale auroral arch of little change from 8.30 p. m., lasting until 7.25 a. m. of January 6.—January 6: High, gusty gale from N. to NE.; much horizontal mirage during the morning; auroral haze from 5.10 p. m. to 11 p. m.—January 8: Moderate snow fell.—January 9: Heavy snow fell.—January 11: Terrible snow-storm from the high winds driving the recently-fallen snow.—January 12: Light gale from the south; little snow fell.—January 15: Much fine snow sifted during the day.—January 16: Variable gale from the south, with drifting snow.—January 17: Strong gale from the south; temperature rose to 41°; snow much melted.—January 18: Violent gusts of a hurricane rate from the south; ice carried high on the beach by the tide and wind.—January 20: Extremely beautiful forms of upper clouds to-day were the admiration of all who witnessed them.—January 21: Pale lunar corona.—January 22: Fine snow of delicate prisms sifted from the sky; pale lunar corona in the evening.—January 23: Faint halo of 22 degrees around the moon.—January 24: Faint lunar halo of 22 degrees.—January 25: Great amount of frost spiculæ deposited on everything; these spiculæ frequently attain a length of 2 inches and form a beautiful scene when the sun shines on them.—January 27: Solar and lunar halo of 22 degrees.—January 28: Parhelia at 11 a. m.—January 30 Many frost films in the air.

FEBRUARY, 1877.

February 1: Light fog in middle of day; pale, white halo around the sun.—February 2: Temperature, 41°. 5; pale aurora of two arches from 5.24 p. m., obscured by clouds at 10.30 p. m.—February 3: Pale halo at noon; slight mirage; pale aurora, with well-defined dark segment from 8.30 p. m. to 10 p. m., and then obscured by clouds.—February 4: Light to a gusty gale from N. to NE.; snow drifted furiously; a bright vertical beam 10 degrees in length passed over the moon's disk in the evening.—February 5: Solar halo and parhelia.—February 7: Parhelia at 11 a.m.—February 8: Parhelion at 11 a. m.; pale auroral arch from 9 p. m. to 11 p. m.—February 9: Many frost films in the air; parhelia and solar halos.—February 10: Pale auroral haze from 5.50 p. m. to 11.10 p. m.—February 11: Halo of 22 degrees around the sun; beautiful red and gold sunrise; much mirage.—February 12: Mirage to a slight degree; faint parhelion at 2 p. m.; a pale auroral haze at 7 p. m., increased to form an arch at 9.10 p. m., with several sheets of low intensity below it at the eastern end; at 9.30 p. m. signs of breaking into two arches with several patches of less intensity trying to form a third arch, at which time only the central arch was perfect; at 10 p. m. three imperfect arches; at 11 p. m. three full arches of light intensity; at 1 a. m. of February 13 a broad arch diffused itself 20 degrees wide and gradually became narrower to fade out of sight at 5 a. m.—February 13: Auroral haze began at 6 p. m., lasting until 9 p. m., when it faded out of sight to recur as part of an ellipse and very bright with considerable wavering, lasting until 4 a. m. of February 14.—February 14: Much horizontal and vertical mirage; three parhelia and a halo from 1 to 4 p. m.; vertical beam was 8 degrees high at sunset; contact arch much V-shaped; pale auroral haze from 5.50 to 8.10 p. m.—February 15: Much snow flying; mock suns, parhelia, vertical beam, and a halo during the day.—February 17: Much flying snow; a vertical beam at sunrise, a pale halo and two parhelia during the day.—February 18: Parhelia and flying snow films; pale auroral arch from 8.20 p. m. to 11.15 p. m; minimum temperature 50° to-day; I learn from natives living on the north side of Norton Sound that the bright meteor of November 17, 1876, was seen all along that coast.—February 19: Temperature low as —50°, giving a mean temperature for the day of—45°; much mirage; pale auroral arch at 9 p. m.—February 21: Auroral arch of coppery color; much vertical and horizontal mirage to day.—February 22: A beautiful red sunrise.—February 23: Much mirage all day.—February 26: much mirage in a. m.—February 27: Miles of mirage; part of an eclipse of the moon was observed.—February 28: Much mirage; lunar halo and parselenes at 9 p. m.; this has been the coldest of all months since I have been here.

MARCH, 1877.

March 1: Pale aurora nearly obscured by clouds; two species of flies were seen in the house to-day.—March 4: Much mirage.—March 5: Sudden envelopment of fog from 2.20 p. m. to 5 p. m.—March 6: Much mirage, great amount of frost spiculæ on everything; auroral haze from 9.10 to 10.35 p. m.—March 7: Much mirage.—March 8: Brilliant red meteor at 6.40 p. m. in S. 80° W. at an altitude of 20 degrees.—March 9: Much horizontal and little vertical mirage during the day; an auroral light showed through the clouds at 6.25 p. m. and rapidly advanced to 50 degrees south of zenith as a hazy band, with its center over the magnetic meridian; then a clear space of 20 degrees wide; at 5 degrees south of zenith a broad, swaying band of 25 degrees wide, composed of vertical beams, rushed over the sky from east to west and *vice versa* with such rapidity that it was at times hardly credible; at 7.20 p. m. an attempt was made to form an auroral corona of broken, scattered beams, which whirled in the zenith like a whirlpool of water; some of the beams revolving twice round the center, lasting only a minute, to burst out with a flash to scamper off to the westward, where the end of the arch was extremely bright; violet, green, blue, red, and different shades of yellow were seen in this display; at 8 p. m. a broad, surging band of 15 degrees was holding across the zenith from east to west, with beams dancing along its length; at 9 p. m. the aurora was nearly spent and at midnight

was presenting only a faint color, becoming obscured by the clouds.—March 10: A low auroral arch from 9 p. m. to 11.20p. m.—March 11: Auroral arch from 9.25 p. m.; to 11.50 p. m.; much mirage.—March 12: Very strong mirage.—March 13: Aurora seen through the clouds; mirage at 7 a. m.—March 15: Much mirage.—March 19: Red-poll linnets (*Acanthis*) came to the redoubt to-day; these birds are residents of this vicinity and are only migratory according to the exigency of the weather.—March 20: Much mirage.—March 23: Mirage; aurora of five arches; moonlight too bright to allow much intensity of color in the aurora.—March 24: Lunar corona.—March 30: Slight spits of snow.—March 31: Light gale and gusty from NE.to SE.

APRIL, 1877.

April 1: Snow much melted, ground quite bare.—April 2: Snow fell abundantly on the hill-tops, with rain in the valleys.—April 3: Light rains.—April 4: Light snow; strong gale from E. to SE.—April 5: Light gale from S. to SE.; ptarmigans and red-poll linnets are quite plentiful; much of the snow has melted; little snow in large flakes fell.—April 6: Blue-bottle flies were humming round the houses to-day.—April 7: Auroral arch from 8.40 to 11 p. m.—April 8: Auroral arch from 8.20 to 9.40 p. m., and obscured.—April 9: Snow fell late in p. m.—April 10: Strong gusty gale from north.—April 11: Strong gale from N. to NE; sleet fell in small amounts.—April 12: Light snow-fall.—April 13: Sleet and rain of light character.—April 14: Several spits of snow fell, harder on the hills.—April 17: Parhelia and a halo with faint contact arcs.—April 18: Faint aurora at 11 p. m.—April 19: Solar halo of 22 degrees at 2 p. m; gulls are reported to be plentiful outside of Stewart's Island.—April 20: Arrival of a trader from Nulato, on the Yukon River; states that the portage between that place and here is nearly bare of snow; the creeks and other streams are full of water; that ducks and gulls were seen in that vicinity.—April 21: Light gale from NE. to SE.; heavy rain in the distance.—April 22: Gusty gale from SE. to S.; heavy showers of rain.—April 23: Gale rate of wind from the south; rain fell heavily in the distance.—April 24: The snow has disappeared as if magic; much vertical mirage; a mosquito was seen to-day; gulls (*Larus barrovianus*) were seen flying high in the air to-day; halo round the moon.—April 25: Arrival of a trader from the Lower Yukon; reports warm weather with much rain; geese and other water birds are plentiful in that vicinity.—April 27: Several pairs of geese have been seen to-day; I think the absence of snow does not favor the arrival of the geese.—April 28: First appearance of the Lapland long-spur (*Calcarius lapponicus*) to-day.—April 29: Parhelia with considerable "tails" were seen to-day; mirage of varying amounts; a pair of ducks was seen; the first goose was brought in to-day.—April 30: Many species of ducks, geese, snipe, and other water birds have arrived within the last week; several species of insects have also been observed; it is considered to be a very open spring.

MAY, 1877.

May 2: Halos, parhelia, and contact arcs with a parhelic circle; the halos of 22 and 46 degrees were well developed; parhelia at 15, 22, 30, 46, and 90 degrees; the anthelion was extremely bright; the parhelia at 22 degrees were so bright as to rival the sun in splendor.—May 3: Strong gale from N. to NE.—May 5: Light rain.—May 6: Light gale from SE. to S; several spits of snow.—May 7: High storm from the south; snow-squalls frequent.—May 8: High gale from E. to SE., with light rain.—May 10: Light rain; ice formed in the night.—May 11: Light snow; ice formed last night.—May 12: Ice breaking off and going out to seaward; little ice made in the fresh-water pools.—May 13: Heavy snow on the high hills; sea is reported to be free from ice about 10 miles distant.—May 14: Much vertical mirage.—May 15: Rain and snow fell; ice made in the night.—May 17: Sleet in slight amounts fell.—May 18: Sleet-squalls; ice rapidly going out.—May 19: Gusty gale from the southeast; ice all gone.—May 20: Ice-jam in the bay.—May 21: Sleet-squalls prevailed.—May 22: Light rain; very gusty at times; arrival of swallows (*Chelidon erythrogaster*).—May 28: Several peals of loud thunder and vivid flashes of lightning in the distance; few drops of rain; brownish haze has prevailed for several days.

JUNE, 1877.

June 1: Ice moving in from the northeast and northwest; halo, parhelia, and contact arc.—June 2: Ice to southward all gone.—June 4: Light rain, fog later.—June 5: Foggy early.—June 6: Ice all gone from sight; salmon are reported to be plentiful outside the island.—June 9: Rain and hail; a single peal of thunder.—June 10: Foggy; vegetation rapidly springing up.—June 11: Traders from the upper part of the district arrive; reports of early spring throughout the district.—June 16: Many peals of thunder; rain at noon.—June 17: Herrings are plentiful in the bay.—June 19: Arrival of schooner General Miller from San Francisco via Unalashka.—June 20: Arrival of Loleta from San Francisco.—June 27: Very hard rain.—June 28: Moderate rain.

JULY, 1877.

July 2: Light rain.—July 3: Moderate rain.—July 5: High winds.—July 6: Frost, gusty gale from the east.—July 7: Moderate gale from S. to N.—July 8: Irregular rains.—July 10: Light showers at intervals.—July 11: Light rain.—July 12: Heavy rain.—July 14: High winds; arrival of steamer St. Paul; orders received from the Office of the Chief Signal Officer, U. S. Army, directing me to turn over all property of the United States in my possession to Private E. W. Nelson, Signal Corps, U. S. Army, and relieving me from duty at this station; all property was turned over and I proceeded to San Francisco and thence to Washington, D. C.

The following considerations of the meteorology of the vicinity of Saint Michael, Alaska, are intended to convey a general description of the principal features incident to this area. Though

imperfect as the knowledge is, and recognizing the necessity of carefulness, I shall endeavor to present only facts, and leave the more important deductions to be made by those better pre to undertake the task.

The system of observations undertaken by me should not be considered perfect, as I have, in a great measure, relied upon my own tact, through an inability to obtain the much-desired instruction and advice from the proper authority from the first to the last of my three years' stay at this place.

ATMOSPHERIC PRESSURE.

The variability of pressure at all seasons, depending as it does on the influence of locality, is sometimes greatly extended, so that a considerable district is included in the area of low pressure in summer and generally local in winter, while area of high is usually more restricted. The fluctuations of the barometric column are great. Usually a low barometer is preceded by a high range, and *vice versa*.

The oscillations, considered for a season, are much greater in winter than in summer. At times the fall is regularly graduated and at others rapid in extreme, while opposed to this the column is sometimes very sluggish, scarcely moving for the entire day. In the winter oscillations a rise or fall of seventy-five hundredths of an inch is recorded several times.

The average low winter pressure will be found to result more from the quick succession of storms than from any other cause. Wave after wave of cold, each succeeded by one of warmer, will keep the column in a state of continual oscillation. The fall is usually more noticeable and extended in winter during a storm from the north or northeast than from any neighboring effect of heat.

The oscillations during a storm correspond to the variable force of the wind, and usually coexistent with the greatest force of the wind.

The extreme height of the barometer is usual in November upon the setting in of winter, reading 30.960; a corresponding low from the increasing heat of summer in May, reading 28.701. A continued maximum, when the barometer reads above 30.00, is of frequent occurrence in all seasons of the year. A corresponding low prevails to a less degree. Often periods not controlled by other than local influences show that the rain-fall begins at one-tenth of an inch below an assumed mean of 29.700, and the column wavers upward immediately on the fall of the first few drops.

TEMPERATURE.

The range of temperature, covering the extremes of 75° in June and —50° in February, is extremely variable for each month, and this for the different years is irregular.

Starting from April, we find the mean monthly heat increases almost uniformly to a maximum mean of 55°.355 for July and 52°.996 for August, then as steadily declines during the fall and winter months, usually reaching its minimum mean in February or March.

The minimum may occur in either of these months. During the winter the temperature is subject to a greater range for each month than in summer. In January a range of 80° has been recorded as the extremes for a month, and in July a range of 32° was the greatest. Ranges nearly as great as the former may occur at irregular periods during the winter. The least variation between the extreme means for any two days in a month is found usually in August, when 8°.5 is read, while the greatest variation between the extreme means for any two days in a month is found in January, giving a reading of 50°.75. The greatest monthly variation is found in July, with the mean of 55°.355, and February having a mean of —23°.8, making a difference for the extremes for the months of 79°.155. That this latter is exceptional will be seen from the appended summary.

The least daily variation, derived from the maximum and minimum thermometers, shows only 2°.5, while 4° to 5° is common.

HUMIDITY.

The prevailing high humidness of the air in this locality shows considerable variance between the winter and summer; in the latter reading occasionally as low as 40 per cent., and usually at

70 per cent. reaches its maximum extended period in winter, where for months the record of saturation is not broken. This is further proven by the fact that a piece of ice half an inch in thickness will be two months clinging to an erect pole. The least amount of vapor in the air is recorded from 11 a. m. to 3 p. m., or corresponding to the maximum heat for the day.

This is, I believe, somewhat at variance from the usually assumed rule.

The humidity of the various surface-currents also presents great differences. The northeast current contains least humidity, though this wind, being the most frequent, presents many irregularities.

Following the card of winds to the south, the humidity increases, while south-southwest diminishes to a slight degree. From north back to southwest the humidity increases. Of all the winds, the southwest contains the greatest amount of moisture, and is sure to result in rain or fog in summer if the wind should back. To this the month of June, 1877, presented some exceptions.

The wind blew from the southwest during the night, laden with moisture, and backing the following morning north or northeast (a warmer wind), brought on fog as a thin stratum, though not at any time as it was in former years.

RAIN.

Rain usually begins, with low, foggy clouds, precipitating small drops, and generally increasing in size to the middle of the shower, then decrease to taper off a longer time than beginning. Mists to moderate is the usual character of the showers. Hard dashes seldom occur, and then never with that violence that seems to fall on the mainland but few miles distant, or in warmer countries. Shower after shower hangs in the neighborhood, rarely approaching within 2 or 3 miles, and carried to either side, generally to the west. Thunder and lightning seldom accompany these showers. Only once has a shower, accompanied by vivid lightning and loud thunder, passed overhead, and then rivaled a thunder-storm of the Middle States. Thunder is sometimes heard in the neighborhood, though not more than three or four times on an average in a year. Lightning is yet rarer. The greatest amount of rain usually falls in August, and for any one day the greatest recorded depth is .83 inch, while showers are frequent that give .1 to .3 inch.

Rain occurs every December upon the winter solstice. The exposed thermometer has read 24°, while rain during this period occurred.

Hail from a heavy cumulo-stratus cloud has twice fallen, and was restricted to an area of probably less than 3 square miles. No visible electric display accompanied these falls. The latest rains that fall are frozen the instant they touch the earth, these occurring in October or November.

I have thought that it is probably a provision of nature to overload the weeds and grasses to break them to the ground, that the seeds may be more protected from cold by the approaching winter's snow.

SNOW.

Snow usually falls in moderate quantities. A depth of over a foot has occurred but twice in three years. A hard wind generally accompanies the storm, so that it is usually drifted the instant it touches the ground. It may fall in any month but July.

Once the old and new snow met on the highest hilltops. Varied forms of flakes are met, but usually the compound flakes are precipitated upon a high temperature, while the smaller kinds fall during cold. Often fine flour-like particles are sifted from a thin veil of cirro-stratus and thin stratus; this rarely exceeds one-tenth of an inch in depth. During clear weather frost-crystals sift from the sky and can only be recognized by looking over the top of a building while the comb of the roof hides the sun. It is probable that the greater part of these frost films do not reach the ground, as all my endeavors to collect them on black paper in a situation well guarded against currents of air were fruitless. Sometimes when a crust is formed on the snow, the heat absorbed into the earth through the snow liberates vapor, which, emerging through the snow, is crystallized in long spiculæ like a forest of feathers, minature ferns, and palm leaves.

In February, 1875, I noticed a V-shaped halo on the ice below me, and extending a great distance, regularly diverging with the apex toward me. I now venture to suggest that these frost-crystals on the ice might produce such refraction and reflection.

Frost spiculæ attain a length of 2 inches during a temperature between zero and melting-point of ice and a light southwest wind. These grow on all objects, though on posts, palings, feathers and hairs the most beautiful needles are formed. They are generally broken off by a succeeding wind.

The results obtained from measurements of snow have been very much less than the actual amount. No sooner does a snow begin to fall than a wind will drift it into the sea or interior. The annual fall is probably not one-half so great on this part of the coast as it is in the interior but few miles.

I estimate that only about three-fifths of the true amount has been recorded, so deficient have been the snow measurements. It has a range of seventy degrees of temperature for falling. Large flakes, almost snow-balls, have fallen when the exposed thermometer read 40°, and the lowest has been—30°.

The greater amount of snow falls in March, and as this month is the windiest, it is very evident that the foregoing statement may be correct. I estimate, roughly of course, that the snow-fall of winter is fully one-third greater than the rain-fall for summer.

DEW.

Dew is not often noticed, probably from the fact of the short nights during the period that dew should fall. It is most often noticed in August and September, sometimes forming copiously.

FOG.

Fog is rare in winter and more common in summer, as often the result of the low descent of clouds as to the effect of the intermingling of two currents of air having different temperatures. Fog-patches are often seen on the low grounds. A general fog attends the breaking up of the ice in spring, and is said to be an index to the breaking up of the ice in the Yukon River. On two occasions this has been verified.

The fog-cloud seldom lasts longer than a day, still more often for only a few hours, though intervals of more or less density have prevailed for two or three days. A wind backing to the southwest after a warm spell usually produces the most persistent fog.

CLOUDS.

Situated as this part of the country is, and partaking the nature of both a marine and continental climate, the amount of cloudiness is not so great, after taking an extended period into consideration.

The proportion of cloudiness is taken at 2 p. m.; about equal to the amount of clear and fair days taken at the same hour of the day.

From June to November the amount of entire cloudiness consumes about two-thirds of the time.

From November to March the number of clear days equal at least those of cloudy, while fair days are proportionate equally to either.

The ratio of clear to cloudy is one to three, while fair stands two to three. To be plainer, one day in six is clear, two fair and three cloudy, when taken for an extended period.

The greatest number of clear days occur in November and February; the latter somewhat in excess of the former month.

STRATUS.

I have divided the stratus cloud according to its apparent height by a qualifying word.

This cloud, usually low or at a medium height, presents its characteristic color. Variability of color is recorded whenever occurring.

Sometimes in moderate weather the color assumes the deepest blue-black, having this color more intensely than in any other form of cloud.

Stratus prevails to a greater extent than any other cloud, often continuing for nearly a month

at a time. Stratus and nimbus are so intimately related that to separate them would add confusion, and I have used the term nimbus for an actual raining-cloud. From these two kinds the greater part of the precipitation falls, excepting the finest particles of snow.

CUMULO-STRATUS.

Cumulo-stratus, attendant upon the warmest days of summer, is the most prevalent cloud during that season, and attains the magnitude it does in warmer latitudes. Far in the edge of the east or south horizon, several small, firmly-outlined clouds will expand to overspread the greater part of the heavens by 2 p. m., and from these the most copious showers of rain fall. The height of this cloud is from 2,000 feet to about 2 miles, usually of blue color and white edges.

CUMULUS.

Cumuli are classed as belonging to the lower system of clouds, and rarely present any other appearance than extraordinary cumulo-stratus. But few distinctions have been made in the daily journal between these two clouds.

True cumuli rarely approach nearer than 6 to 10 miles, and more often the heads of the clouds are but little raised above the horizon. These clouds are principally formed in the southeast and west-southwest.

I noticed rain to pour from one of these clouds in June, 1875, for several hours on the mainland, about 20 miles distant, and accompanied by thunder and lightning.

The usual color is dark blue to bright indigo, and occasionally silver-edged.

CIRRO-STRATUS.

Cirro-stratus is not often observed, and is usually the result of rapidly descending cirri. Stratus and cirro-stratus are at times scarcely distinguishable. Snow in finest, round, firm rifts form this cloud in winter. The usual color is grayish.

PALLIO-CIRRUS.

This cloud forms itself in such an incredibly short time as to give but little time for its study; it disappears as suddenly. Usually perfect, and really an exaggerated form of low globular cirro-cumulus, rarely moves from any other point than north or south, and is almost certain to result in snow. It seldom remains longer than three hours, and but once hung for three days, this seldom attaining sufficient density to veil the sun, and presents that singular phenomenon of sunshine and clouds. It has a pale-blue rounded form and white-edged, seemingly in a state of repulsion.

CIRRO-CUMULI.

The prevailing forms of this cloud are the apparent converging bands, often of the greatest delicacy of texture.

On one occasion eleven perfect bands were seen, and four to seven being common. These bands usually extend due east and west, moving from south, rarely from north; and northwest and southeast, moving from northwest, rarer still north and south, moving from either point, though more frequently from south; and southwest and northeast from either point, though most frequently from northeast.

These bands most often extending east and west is probably due to the indrawing effect of the ascending and descending currents near this latitude.

Broken bands and irregular forms are common. One of these irregular forms is like a wall of masonry with the mortar left out, and, if in the east or west near the time of sunrise or sunset, it is most beautifully tinted with a rather deep pink, forming a splendid spectacle.

The cirro-cumulus cloud has a great range through the atmosphere of probably 1 to 4 miles. Their color is usually pale pearly-blue to white.

CIRRI.

The prevailing forms of this cloud are pencil-streaks and whirls. Many modifications occur, which bring the cirri and cirro-cumulus in such close relationship that it is often a matter of nice discrimination to separate them. In this condition they are recorded as intermixed. This condition may continue for several days with not another cloud to be seen, and calm to gentle surface-currents, while the two clouds are being rapidly hurled from north to south, or, more commonly, *vice versa*.

Above this intermixture and the upper limits of the cirri are multitudinous modifications of the primary cirri. Among these the principal varieties are jelly-fish (usually head to the wind), horsetails (rare), wisps, plumes, and filoplumate curls, pectinate and double pectinate; forms like the blur of a moderately-stretched cord having locks of loose cotton closely arranged on it and the string put in motion with a twang of the finger. This appears to be the pencil and curl cloud interformed.

Many other varieties, such as the fancy can suggest, are also seen. The cirro-cumuli and cirri in this latitude presents such attractive forms that the pen cannot describe and only the most skillful brush portray.

Pale, scarcely distinguishable cirri rapidly form the frayed curl cloud, descend through the cirro-cumulus region, seem to miss the cirro-stratus, and form stratus in such a short time that it is hardly credible. Rain in the summer or snow in winter is sure to result from this rapid descent.

SUNSET SHADOWS.

Sunset shadows are seldom seen, and more rarely perfect. On one occasion eleven perfect bands or fingers were seen to point to the zenith when the sun was within 2 degrees of setting.

CLEAR WEATHER.

The sky is often clear of clouds for days at a time, especially in the months of November and February; clear days occur rarely in the summer, and are then pleasant in the extreme.

I have entered only absolutely clear weather as clear, or with such few exceptions as will readily show themselves.

WINDS.

In the earlier months of my stay at this station I recorded the winds in their subdivisions of the eight principal points of the compass, but later I have disregarded this on account of the extreme unsteadiness of all winds.

The oscillations of the vane are extremely rapid, and covering on one occasion a range of 180 degrees, while the usual swing is 15 to 80 degrees, 45 being common; steadiness of the vane being very rare, and then only in light to fresh winds.

SURFACE-CURRENTS.

North wind.—This wind prevailing in the southwest and westerly quadrants of storms, has a general tendency to veer, and often, by its extreme unsteadiness, oscillates from north 18° degrees W. to NNE., or even to ENE. It blows for days together without a sign of cloud. Its velocity is extremely variable, from light breeze to a terrific hurricane.

In October it blows for weeks at a rate of from 15 to 70 miles per hour, while for the other seasons its average rate is about 34 miles. During the prevalence of this wind fair to clear weather obtains. This wind is taken as the standard for relative frequency, and will be considered as the unit of ratio.

The temperature of this wind is low.

Northeast wind.—The northeast current so nearly resembles that of the north that to separate them is more convenient than advisable. The oscillations of the vane, during high winds from this point, cover two-thirds of the oscillations for the north wind, besides having its own tendency to eastward. Its velocity is usually about 31 miles, and ranges from light to highest storm-rate.

This wind is the most frequent, and has the ratio of two to one of the north wind. Its temperature is higher than that of the north wind.

East wind.—A due east wind seldom prevails, as it has an east-northeast or east-southeast tendency. It seldom lasts longer than one day, and usually for only a few hours, as it is in general only blowing during the passage of northeast to south. Its velocity is high, about 28 miles per hour, and on two occasions has exerted itself to a hurricane-rate, once of 86 miles and at another time of highest storm-rate. Its temperature is warm, generally pleasant.

It has the ratio of five-tenths to that of the north wind.

Southeast wind.—The wind prevails from this point so seldom, and often in the relapse of the north quadrant of storms, or else when the northeast wind is veering to south for a long period.

This is the warmest of all the winds, and raises the temperature many degrees in spring, at the season when this wind occurs most often, and attaining its greatest violence, sometimes that of a hurricane-rate to that of highest gale. It is intimately connected with the south wind.

Exceptions hold this wind for thirty hours, but the average duration is not longer than five hours, with an average rate of 35 miles, always having a tendency to veer. It has a ratio of .25 to the north wind.

South wind.—The surface current from this point is the most frequent of the southerly winds. It is the great current pushing toward all the storm centers of Northern Alaska. For days in winter, and longer in summer, it will hurl masses of air at least a mile deep, and often 4 miles deep, northward, at a rate of 50 miles per hour, and for hours asserts its terrific hurricane strength of 85 to over 100 miles per hour. A short lull usually occurs in the center of these storms. The vane is comparatively steady, considered for hours, but has sometimes a backing or veering tendency, or even both, of 20 or 25 degrees on either side of south.

To this wind we owe our very existence in this country. By its power the ice is forced through the straits. The tides caused by this wind raise up and break the otherwise firmly bound shore-ice. Our annual supply of wood is thrown on shore by this wind and its accompanying tides.

The temperature of this wind is higher than any other wind, excepting the southeast. It has about the same frequency as the north wind.

Southwest wind.—This wind, occurring so frequently and usually the resting point for backing winds from the northeast, has a ratio of four-fifths to one of the north wind for frequency. Being most often the result of a backing wind, it has the effect to reduce the temperature 15 to 20 degrees. By its low temperature it causes the greater amount of fog at this place. It always has a tendency to veer, rarely backs, and especially to veer if the wind should *back* to this point. Its rate is usually 30 miles per hour, and very seldom blows over 50 miles per hour.

West wind.—This wind, usually prevailing in that quarter only temporarily, and from a backing wind, has an effect to lower the temperature, but if veering to raise it. This wind, usually fresh to brisk, has but once reached a gale rate of 55 miles per hour. It has a ratio of .25 to one of the north wind.

Northwest wind.—This is intimately connected with the west wind, and like it usually temporary in that point for only a short time, and usually the result of backing. Its temperature is low. Its ratio to the north wind is as one-fifth to one.

The rate of the wind is inconsiderable, seldom over a brisk rate, and its highest recorded velocity is 48 miles an hour.

That the west and northwest winds should occur most frequently I am led to infer from the fact that during the winter of my first year at this station a delegate was sent from the neighboring native village to request me to turn the dial of the anemometer so that it should face the west, as it faced east-northeast, as the reindeer in moving go against the wind, and that would bring them to this part of the coast.

After some parley I convinced the native that the machine did not make the wind. I never heard anything more about it.

GENERAL REMARKS CONCERNING THE WIND.

The intermediate winds have been left out, and included in the remarks for the eight principal points. A few remarks concerning the surface winds will not be out of place.

The effect of backing, if on the west side, is to lower the temperature; hence to veer on that side is to raise the temperature.

To veer on the east side is to raise the temperature; to back is to lower the temperature. The ratio or frequency of veering or backing is greater for the latter. A view of the "summary" will show the number of times of frequency from all recorded points of the winds.

Upper currents.—Of these there are four, of which the one from the south is the most frequent, and probably equal to that of all others. The north current is the next most frequent; then is followed by one from southeast and one from northwest, the former in excess of the latter for number of times.

At times streams of upper clouds are carried from south for days and even weeks at a time; even if the lower sky should be clouded for a time during this period, I have reason to believe that the upper current has not been interrupted.

During the latter days of my stay I began to foretell changes of wind on the surface from north to south by these upper clouds moving from north. It has but rarely failed unless the whole mass of the atmosphere was to move from the south.

TIDES.

Tides forming a part of my regular observations, demand attention. The observations have been most of the time without a proper gauge, as the bottom in the arm of the sea here consists of fine volcanic gravel and ashes, which make a very unstable foundation for a gauge. The high waves have carried out three gauges; hence I have adopted permanent stones and rocks for the necessary measurements.

The effect of the attraction of the sun and moon on the water in Norton Sound is to raise a tidal wave of about 2½ feet in height. This is proven during periods of comparative quiet, when the winds are at rest.

The winds having a much greater effect will be considered next.

Starting from the north and northeast, the effect of brisk to high winds continued for two days is to lower the water of this part of the sound about 1½ feet, and continues in this proportion for each day of winds from those points, though a northeast wind is more effective than a north wind, as will be seen from the trend of the coast and the low pressure to the westward.

The east wind occurring but seldom, and never so vigorous as to produce any appreciable effect, is left out of the question.

The southeast wind, holding for two days, by its southward tendency always raises a tide 4 to 6 feet above mean. This extreme tide occurs usually in the months of May and September. The south wind exerts the greatest force, and raises the tidal wave to the extreme of 6 to 7 feet above mean tide.

The hard storm attendant upon the winter solstice produces annually an extreme tide of 7 to 8 feet. This, and the southeast wind are the opposite in power to the north and northeast.

The north wind in the month of October, acquiring a high storm velocity and lasting for many days together, throws 7 to 8 feet of water out of Norton Sound.

The shallowness of the 3-fathom curve bounding this part of the coast, and the low tide, would render it very unsafe for any craft to be inside.

The beach around the island, facing the sea, is narrow, only a few feet, and composed of fine volcanic sand, the remains of the solitary basalt-rock which forms the foundation of all this part of the coast, and, from its extreme hardness, is well termed iron-bound.

When I first came here I made notice of certain unchangeable places on the beach, and these are now 18 inches above the level taken at that time.

American traders who have been here ever since the occupation of the Territory concur with me in the statement, *i. e.*, that the coast is rising. The natives inform me that many years ago an earthquake occurred in this locality and raised the coast several feet in the neighborhood of Kegúkhtouk, a village about 18 miles east of this place. The fierce beating of the north and

northeast winds in October throws huge winnows of sand on the beach, and are not conformed with the general level until the following spring.

It is rare that more than one tide occurs in a day, and in those times is what is termed a long and short tide.

The usual time of high water occurs fifty minutes later each day, though there are so many exceptions that it cannot be given as a rule.

For several days the rising of the tide is shortened in time, and floods at nearly the same hour for several days. No positive rules can be laid down by me on the tides.

RAINBOW.

This spectacle occurs seldom, by reason of the entire cloudiness during rain. In summer the bow is sometimes complete, and does not differ from those in lower latitudes. In winter an arc of 10 to 20 degrees will sometimes be seen, and on one occasion, when only a slight rift toward the sun made opposite to it a rainbow whose length was scarcely half its width.

In November, 1874, an arc of 15 degrees in height was seen, and besides the primary bow there were three supernumerary bows of variable colors, as given in the journal for that day.

I can conceive of no more beautiful object in nature than this spectacle so brightly displayed against a sky of leaden hue.

The fog-bow is sometimes seen during the day, and on several occasions after night. Only once, and then after night, did it incline toward prismatic coloration, and that of faintest red.

CORONÆ.

Coronæ have never been seen, excepting surrounding the moon. A white mass of stratus in winter, if not of too great density, produces this phenomenon in its greatest brilliancy. The different rings are of variable width.

HALOS.

I shall divide the halos into three classes, according to intensity or absence of coloration.

A pure white halo of 22 degrees often occurs during a time of clear upper sky and the lower atmosphere filled with finest frozen fog-like particles. It is probably due to the smallness of these particles that the halo is colorless, for the same reason that a fog-bow should be white.

A second kind of halo occurs frequently, which I have recorded on the Form 4 as a dark halo of 22 degrees. It usually occurs during a very dense streaked cirri veil, and increases to such density as to obscure the sun.

In my earlier days I have frequently noticed that if a piece of perfectly clear ice is held at a certain angle, and looked through edgewise, it appears black. I now venture to suggest that the films of ice in the atmosphere were descending at this angle, and hence the halo appears dark. The inner edge of the ring is usually whitish, but the line dividing the dark and white circles is very apparent to an observer.

This halo and the first mentioned halo are always without parhelia or contact arches.

The third class comprises all the halos that exhibit prismatic colors.

The sun during the season for this phenomenon does not rise sufficiently above the horizon to permit an entire halo of 22 degrees to be observed, but it has frequently descended to the ground and not distant half a mile; and was one time, as previously referred to, seen on the ice at a diverging angle; probably the reflection of the portion in the air. The halo of 45 degrees has been recorded several times. These two alone present coloration, oftentimes very brilliant, but always less so on the one of 45 degrees than on the one of 22 degrees. The parhelic circle has been seen complete on two occasions, and always white.

Parhelia at the intersection of the two halos are common enough; often the tail is prolonged to several degrees. The coloration of these is extremely bright, and sometimes so brilliant as to dazzle the eyes. The contact arch is seen only above the sun for reasons stated before.

These are more noticeable during the descent of frost films, and are best observed by looking over the top of a building to hide the sun.

The "horns" are fully developed, with the lenticular space well preserved. They exhibit

pale, prismatic colors, most often red. Vertical beams are sometimes noticed, but they rarely intersect the halo of 22 degrees. They are more often 5 to 8 degrees above and below the sun or moon. Like the parhelic circle, they contain no trace of coloration. The anthelion is seen only with the parhelic circle complete.

In March, 1875, traces of parhelia, on the parhelic circle, indicated the presence of the halo of 90 degrees radius. In May, 1877, it was more plainly seen.

MIRAGE.

I have divided this phenomenon into two kinds, viz, vertical and horizontal, or lateral, the vertical mirage being the commoner of the two.

During the moderately fresh winds, or seasons of calm in winter on clear days, this kind of mirage is seen. It lasts with varying intensity for the entire day, often extending along the coast for miles. The horizontal mirage is less common and usually weak. Occasionally the high hill-tops, off 30 or 40 miles, are thrown into the greatest confusion, or else extended laterally over a considerable area, or distorted and broken.

This kind of mirage seldom lasts more than half an hour after the sun has risen, and is the most intense about half an hour before sunrise.

The rapidity of motion is greater in the lateral than in the vertical kind. The low coast and absence of trees and bare rocks on the hill sides do not allow of very much variety in either kind of mirage.

TWILIGHT CURVES.

Twilight curves may be seen at any time after sunset or before sunrise, during clear weather. Their occurrence being as certain as the setting of the sun, I have kept no record of them except in the daily journal, and there have merely alluded to them as having occurred during the period referred to.

ELECTRICITY.

Electricity has shown itself to be very abundant during the periods of great cold in winter. Having no special instruments to determine intensity of kind, I shall confine my remarks to those occasions when it was developed by friction of the hand on the fur of a dead animal.

A couple of fœtal seals had been stuffed with straw, and as my hand was stroking them one evening in the dark I noticed sheets of electricity to follow the hand, accompanied by the characteristic crackling. I then tried an india-rubber comb on my dry head, and found that very considerable sparks could be drawn out.

At another time I had occasion to tear a piece of muslin that had been washed, and being where the temperature was at least minus 16° Fah., I found that by simply tearing the cloth a streak of light much like that produced by drawing a match across the moist palm of the hand in the dark could be plainly seen. I repeated the experiment several times, and extended it to stiff manila paper, and with the same results.

I requested Mr. Neumann, agent of the Alaska Commercial Company, to try the experiment, and some time afterward he assured me of his success in producing the same results.

In fact, the air seems to be filled with electricity during the above-mentioned periods. This naturally brings me to the magnetic variation of this place.

I placed the compass carefully on a board constructed to point due north, and for months at a time I have never seen a tenth of a degree variation of the needle from 23 degrees east, not even a tremor being observed during an auroral display. This 22 degree(?) variation is exactly what Capt. E. E. Smith, of the schooner Eustace, informed me had been before determined, but by whom ascertained is unknown to me.

AURORAS.

The auroral displays seen at this station naturally divide themselves into two classes, according to their intensity.

The first of these is what I have described as an auroral haze. It has very slight intensity, no particular form, seldom lasts long, and more seldom recurs. This is the most common display recorded.

The second class will embrace all other kinds, with their variableness of intensity and form. Rarely an arch forms itself unless preceded by the first class as a haze.

This second class to be produced, the haze gathers into a pale narrow arch of variable height, usually at 20 degrees altitude, increases in brightness by 9 o'clock, and then forms a second arch above, at a distance varying from 5 to 20 degrees, and rarely more than 6 to 10 degrees wide. Three or more arches are rare. The single-arched variety has its eastern and western ends incurved at times. Also the eastern end is often broken into a sheet, or patches irregularly scattered, but in the maximum intensity they are absorbed into the arch. Beams, waves, streamers, folds, and other fantastic perturbations attend a brilliant display. These beams move east to west, or *vice versa*, on the arch with a frightful velocity. Sometimes beams move from east to west while others from west to east are being translated with the same rapidity.

No clash or interference is observable. These pulsations sometimes travel the entire length of the visible length of the arch in less than two minutes, and once in less than one minute. The highest grades of auroras seldom occur over this locality. The corona has been but once perfectly developed. The width of beams, arches, &c., are variable, as is also the length of the streamers. The usual color is pale straw to sulphur-yellow. Other colors have never but twice been observed. Recurring fits are but differences of intensity, and may be said to attend all the displays excepting those of the first class. The dark segment, when present, is usually sharply defined.

The frequency of auroras at this station is somewhat less than is assumed for the latitude of 64 degrees north, and is probably due to the prevalence of clouds during the months of greatest frequency. For four months, May, June, July, August, and a part of September, auroras are not observable at all from the twilight. March and February show the greatest number of displays, and for the entire year about thirty-two auroras are recorded.

Summary of meteorological observations taken at Saint Michael's, Alaska.

Date.	Mean barometer.	Maximum barometer.	Minimum barometer.	Mean temperature.	Maximum temperature.	Minimum temperature.	Amount of rain and melted snow.	Number of days on which rain or snow fell.	Clear days.	Fair days.	Cloudy days.	N. (times from).	NE. (times from).	E. (times from).	SE. (times from).	S. (times from).	SW. (times from).	W. (times from).	NW. (times from).	Calm.	Miles traveled for the month.	Auroras.
1874.																						
July	29.902	30.281	29.426	52.7	70	38	1.18	11	19	12	0	16	39	21	26	73	15	8	18	1	9,675	0
August	29.964	30.435	29.375	53.0	67	39	2.07	13	1	8	22	23	87	8	8	48	21	12	8	1	9,005	0
September	29.764	30.101	29.332	42.9	56	23	0.79	4	5	14	11	57	70	23	30	14	7	19	12	5	9,491	2
October	29.639	30.311	29.026	28.4	45	13	2.06	9	2	5	24	20	74	6	6	73	15	16	4	3	11,338	2
November	29.775	30.852	29.085	20.3	42	1	0.78	4	8	7	15	14	105	11	16	43	8	4	5	4	12,264	4
December	29.583	30.580	29.015	16.9	38	−9	2.03	8	5	11	15	2	146	14	7	37	3	2	1	5	14,182	7
1875.																						
January	30.029	30.799	28.875	17.1	35	−37	0.28	3	2	12	17	20	97	16	7	40	18	9	5	5	15,798	2
February	29.753	30.264	29.269	20.4	38	−25	0.09	11	4	11	13	5	115	27	15	27	3	0	1	3	16,344	4
March	29.954	30.703	29.058	0.6	30	−36	(*)	7	5	16	10	32	65	29	7	21	30	19	5	9	18,416	10
April	30.117	30.645	29.481	12.4	39	−28	*0.03	2	9	11	10	26	59	21	0	32	43	12	8	9	11,991	3
May	29.694	30.289	29.277	30.5	42	15	0.31	7	1	13	17	49	77	6	0	15	38	21	9	2	13,797	0
June	29.815	30.368	29.382	44.8	64	29	0.67	6	0	12	18	28	76	18	20	21	27	14	5	1	13,397	0
July	29.925	30.312	29.645	55.4	70	39	1.45	9	1	10	20	69	43	13	9	33	23	10	8	8	14,438	0
August	29.717	30.112	29.301	50.7	64	28	2.21	14	0	3	28	31	21	22	8	44	55	17	11	8	14,827	0
September	29.719	30.289	29.404	45.5	56	30	2.00	11	0	7	23	10	48	19	32	24	54	18	2	8	12,503	1
October	29.694	30.583	28.862	35.4	54	17	0.22	7	9	4	18	20	125	35	7	18	4	2	1	5	16,511	5
November	30.281	30.998	29.399	8.0	24	−17	0.20	3	7	10	12	14	73	16	3	19	41	8	1	30	7,950	7
December	29.966	30.463	29.011	−0.7	29	−32	0.57	2	9	8	14	29	43	10	3	29	65	8	4	26	9,568	12
1876.																						
January	29.814	30.582	29.018	8.9	34	−28	0.33	5	6	10	15	21	48	23	10	69	24	2	0	17	16,298	7
February	30.207	30.689	29.341	−9.3	17	−40	(*)	1	20	3	6	38	73	1	2	11	2	0	1	75	7,156	8
March	30.145	30.598	29.358	7.05	34	−28.5	(*)	7	8	8	15	67	30	27	1	19	30	3	2	38	11,396	4
April	29.899	30.366	29.335	15.7	41	−17	1.58	7	8	9	13	16	86	13	9	19	45	3	4	15	8,477	0
May	.....	.....	.....	37.4	57	16	*0.41	8	0	11	20	44	59	14	37	30	17	4	9	8	.....	0
June	29.763	30.009	29.419	47.4	75	32	1.46	6	1	10	19	52	28	10	8	14	47	10	11	5	.....	0
July	29.808	30.295	29.219	52.7	68	39	1.81	10	3	5	23	23	43	11	25	61	47	1	1	5	13,020	0
August	29.825	30.150	29.196	49.2	64	34	3.13	15	3	9	19	49	44	17	4	18	40	14	17	4	8,779	0
September	29.675	30.285	28.700	44.4	59	31	3.24	17	0	3	27	35	30	27	22	54	22	2	4	14	7,560	2
October	29.665	30.323	28.722	30.3	43	8	1.67	12	1	3	27	87	62	6	6	16	23	1	6	9	17,112	2
November	30.145	30.632	29.495	6.9	36	−24	0.33	9	12	3	15	68	19	4	2	1	40	12	20	44	6,480	7
December	29.749	30.494	28.941	3.4	36	−25	0.10	8	2	8	21	42	73	11	4	31	35	2	0	21	18,720	1
1877.																						
January	29.908	30.427	29.211	1.6	41	−39	0.93	10	4	9	18	33	38	4	3	62	25	7	0	44	14,036	2
February	30.103	30.625	29.371	−23.8	12	−50	(*)	4	19	3	6	58	48	9	0	8	0	7	3	42	4,680	11
March	29.880	30.179	29.290	12.7	38	−16	0.27	3	12	11	8	66	73	27	15	2	1	2	1	31	6,696	7
April	29.704	30.145	29.022	28.2	43	−3	0.42	8	5	10	15	70	73	11	12	21	12	2	5	4	12,456	3
May	29.584	29.992	29.078	37.4	57	16	0.39	5	0	11	20	44	59	14	37	30	17	4	9	3	16,368	0
June	29.821	30.305	29.456	52.2	70	36	1.08	4	3	17	10	60	33	15	18	18	40	9	11	6	12,831	0

* Snow drifted too much to allow accurate measurements.

Thermometric observations taken at Saint Michael's, Alaska.

[Observer unknown. Copied from Wild, St. Petersburg, 1882, p. 236.]

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Yearly mean.
1843	.....	.....	.....	.....	.....	.....	.....	11.2	8.2	0.6	−5.3	−17.1	.....
1854	.....	.....	.....	.....	.....	.....	11.6	9.6	7.0	1.6	−5.2	−16.1	.....
1855	−26.1	−8.1	−13.6	−9.0	−0.7	6.4	13.8	.....	.....	.....	.....	.....	.....
Mean*	−26.1	−8.1	−13.6	−9.0	−0.7	6.4	12.7	10.4	7.6	1.1	−5.25	−16.6	−3.21
Mean†	−14.8	17.6	7.7	15.8	31.5	43.5	54.6	51.3	46.0	34.0	22.6	23.0	25.4

* Celsius thermometer. † Fahrenheit.

Meteorological observations at Redoubt Saint Michael's.

[Cistern barometer No. 1613, and thermometers, by James Green, New York—Observer, Captain Riedell, superintendent of trading-station.]

Date.	Hour.	Att. thermometer.	Barometer uncorrected.	Barometer reduced to standard and 32° F.	Wind.		Clouds.		Detached thermometers.	
					Direction.	Force.	Amount.	Kind.	Dry.	Wet.
1869.		°							°	°
July 3	2 p. m.	64.5	29.919	29.795	SE.	2	10	Cir. nim	64.5	.....
	9 p. m.	55.2	.872	.773	E.	2	10	Cir. strat	56.5	.....
4	9 a. m.	64.0	29.808	29.686	N.	3	4	Cir	65.0	.....
	12 m	61.3	.772	.659	N.	5	4	Cir. cum	62.5	.....
	3 p. m.	61.0	.758	.645	N.	5	4	Cir. cum	62.0	.....
	9 p. m.	61.8	.698	.583	N.	4	3	Cir. strat	62.0	.....
5	9 a. m.	57.5	29.735	29.605	SE.	4	8	Cum	60.0	.....
	12 m	63.8	.757	.637	N.	4	9	Nim	66.0	.....
	3 p. m.	61.8	.739	.624	ENE.	3	10	Rain	64.0	.....
	9 p. m.	60.2	.718	.607	ESE.	4	9	Nim	62.5	.....
6	9 a. m.	66.2	29.796	29.668	E.	6	9	Nim. cum	67.0	.....
	12 m	67.0	.785	.655	E.	6	10	Nim	65.8	.....
	3 p. m.	65.0	.778	.653	E.	6	10	Rain	66.5	.....
	9 p. m.	62.0	.771	.656	E.	5	10	Rain	64.5	.....
7	9 a. m.	63.6	29.754	29.634	ESE.	6	9	Rain	64.0	.....
	12 m	65.2	.769	.645	ESE.	5	9	Nim	66.5	.....
	3 p. m.	66.2	.766	.640	ESE.	5	10	Nim	66.5	.....
	9 p. m.	61.5	.719	.605	ESE.	6	10	Rain	63.5	.....
8	9 a. m.	62.0	29.730	26.615	S.	3	10	Rain	63.5	.....
	12 m	64.0	.730	.600	S.	3	10	Rain	62.0	.....
	3 p. m.	61.2	.744	.631	NW.	3	8	Nim	53.5	.....
	9 p. m.	58.0	820	.714	W.	4	8	Cum.; squally	44.5	.....
9	9 a. m.	57.0	29.928	29.825	NE.	5	8	Cum. cir	56.5	47.0
	12 m	57.0	.934	.821	NNE.	5	8	Nim	55.5	47.5
	3 p. m.	55.5	.834	.825	N.	5	8	Nim	56.0	47.0
	9 p. m.	55.5	.942	.843	NNW.	5	5	Strat	56.5	40.5
10	9 a. m.	62.5	30.025	29.907	NW.	4	3	Cum	55.0	47.5
	12 m	59.5	.024	.914	NW.	4	1	Cum	78.0	55.0
	3 p. m.	58.5	.018	.911	NW.	5	1	Cum	64.5	54.5
	9 p. m.	58.0	.030	.924	W.	2	0	Clear	49.0	43.0
11	9 a. m.	62.5	30.052	29.934	NE.	2	0	Clear	54.0	48.5
	12 m	60.7	.054	.941	N.	4	0	Clear	60.5	50.5
	3 p. m.	58.5	.042	.935	N.	4	0	Clear	63.5	53.5
	9 p. m.	55.2	.040	.941	W.	3	0	Clear	49.0	43.5
12	9 a. m.	64.2	30.028	29.905	SW.	4	9	Cum	53.5	46.5
	12 m	63.8	.008	.886	SW.	3	1	Cum	63.0	53.0
	3 p. m.	62.0	29.998	.881	SW.	5	0	Clear	62.0	51.5
	9 p. m.	57.5	30.020	.915	SW.	3	0	Clear	53.0	48.0
13	9a. m.	63.5	30.012	29.891	SE.	5	9	Cir. cum	54.0	46.5
	12 m	.....	.006	.887	.....	.....	.....	.....	.....	.....
	3 p. m.	61.5	29.998	.883	SE.	4	1	Cir. strat	70.0	59.5
	9 p. m.	60.0	30.030	.919	SW.	3	0	Cir. strat	52.0	46.5
14	9 a. m.	61.0	30.092	29.978	S.	6	10	Nim	53.0	47.5
	12 m	61.5	.090	.975	S.	6	10	Nim	54.0	49.0
	3 p. m.	61.5	.080	.965	S.	6	10	Nim	54.5	49.5
	9 p. m.	61.8	.078	.952	S.	6	10	Rain	51.0	48.0
15	9 a. m.	61.5	30.144	30.029	S.	5	10	Fog	52.0	48.5
	12 m	64.0	.160	.038	S.	5	10	Rain	55.0	51.0
	3 p. m.	62.5	.177	.059	SW.	4	10	Fog	55.0	51.0
	9 p. m.	61.8	.210	.104	SW.	4	10	Cum	53.0	49.0
16	9 a. m.	62.4	30.220	30.102	S.	6	10	Fog; rain	50.0	47.0
	12 m	62.0	.216	.099	S.	6	10	Fog; rain	50.5	47.5
	3 p. m.	59.6	.218	.108	S.	5	10	Nim	52.0	48.0
	9 p. m.	61.2	.186	.071	S.	5	10	Fog; rain	50.0	47.0
17	9 a. m.	61.4	30.126	30.011	S.	5	10	Fog; rain-squalls	51.0	47.5
	12 m	61.0	.120	.006	S.	4	10	Fog; rain-squalls	53.0	49.0
	3 p. m.	60.0	.126	.015	S.	3	10	Cum	56.0	51.0
	9 p. m.	58.2	.124	.016	E.	3	8	Cir. cum	58.0	49.0
18	9 a. m.	63.4	30.114	29.894	SW.	3	10	Strat	54.5	50.0
	12 m	62.4	.124	30.006	S.	3	9	Strat	56.5	51.0
	3 p. m.	61.0	.088	29.974	E.	2	9	Cum. strat	57.5	52.5
	9 p. m.	59.0	.062	.953	NW.	2	8	Cum. strat	54.0	50.0

Meteorological observations at Redoubt Saint Michael's—Continued.

Date.	Hour.	Att. thermometer.	Barometer uncorrected.	Barometer reduced to standard and 32° F.	Wind.		Clouds.		Detached thermometers.	
					Direction.	Force.	Amount.	Kind.	Dry.	Wet.
1869.		°							°	°
July 19	9 a. m	61.5	30.080	29.915	NE.	3	8	Cum	59.0	54.5
	12 m	60.0	.032	.921	NNE.	3	9	Cum	60.5	56.0
	3 p. m	60.4	.022	.909	NNE.	3	8	Cum. cir	61.5	56.0
	9 p. m	60.6	.000	.887	SE.	2	10	Fog	55.0	52.0
20	9 a. m	60.0	29.974	29.863	N.	2	9	Nim	57.5	52.5
	12 m	61.0	.976	.862	N.	2	9	Strat	59.5	54.0
	3 p. m	60.5	.966	.853	N.	3	8	Strat	60.0	54.0
	9 p. m	59.5	.976	.866	N.	1	8	Cir. strat	54.0	49.0
21	9 a. m	64.0	29.962	29.840	WSW.	1	9	Cum.; baffling wind	57.0	51.5
	12 m	64.5	.950	.826	W.	2	9	Cum	61.5	54.2
	3 p. m	63.5	.954	.838	SW.	5	9	Cum. nim	56.0	50.5
	9 p. m	63.4	.952	.831	SW.	4	9	Cum. nim	50.0	47.3
22	9 a. m	61.8	29.932	29.816	SSW.	7	9	Rain	50.6	48.3
	12 m	63.3	.924	.804	SW.	5	8	Little rain	51.3	49.4
	3 p. m	63.2	.930	.810	W.	3	8	Little rain	54.3	51.0
	9 p. m	58.0	.934	.828	WSW.	2	6	Nim	48.0	43.8
23	9 a. m	61.3	29.916	29.801	SW.	1	8	Strat	50.7	47.0
	12 m	54.9	.846	.748	NW.	2	6	Strat	54.3	50.0
	3 p. m	56.9	.842	.739	NW.	4	2	Strat	59.0	51.9
	9 p. m	55.0	.856	.758	W.	5	6	Strat	50.0	45.3
24	9 a. m	65.3	29.930	29.804	NNW.	5	4	Cir	52.9	46.8
	12 m	57.0	.964	.861	NNW.	4	3	Cir	61.0	50.9
	3 p. m	54.3	.928	.822	NNW.	3	2	Cir	65.8	54.2
	9 p. m	63.1	.948	.828	NW.	2	4	Cir	48.9	43.8
25	9 a. m	59.5	30.004	29.894	NNW.	5	1	Cir	53.7	47.4
	12 m	58.3	.062	.955	NNW.	4	1	Cir	64.0	53.0
	3 p. m	57.3	.080	.976	NW.	4	1	Cir	65.0	53.3
	9 p. m	58.1	.146	30.040	W.	4	1	Cir	50.9	45.0
26	9 a. m	59.6	30.242	30.230	WNW.	4	1	Cir	57.7	50.5
	12 m	59.8	.222	.210	NW.	4	1	Cir	64.0	54.5
	3 p. m	57.5	.210	.204	NW.	2	5	Cum. strat	65.0	54.9
	9 p. m	54.5	.202	.194	SSE.	2	6	Cum. strat	52.5	48.0
27	9 a. m	59.7	30.226	30.115	ESE.	4	6	Strat. cum	57.5	49.6
	12 m	62.8	.228	.109	S.	4	8	Cum. nim	60.0	50.5
	3 p. m	60.4	.190	.077	SSE.	3	9	Little rain	57.5	48.7
	9 p. m	58.8	.190	.082	S.	3	9	Little rain	54.5	49.5
28	9 a. m	60.9	30.192	30.078	ESE.	3	9	Nim. strat	51.5	48.3
	12 m	61.8	.148	.032	SE.	5	8	Rain	56.2	50.5
	3 p. m	60.8	.116	.002	S.	1	7	Nim	59.5	53.7
	9 p. m	61.6	.050	29.934	E.	4	8	Nim	57.0	52.8
29	9 a. m	60.8	29.922	29.808	SSE.	4	9	Strat	56.3	51.5
	12 m	61.4	.862	.747	SE.	1	5	Strat	61.3	56.0
	3 p. m	59.8	.770	.659	NNW.	6	3	Cir. strat	63.8	56.2
	9 p. m	59.8	.968	.857	NNW.	3	5	Cir. strat	57.6	53.5
30	9 a. m	65.9	29.612	29.485	SE.	2	4	Nim	63.0	57.0
	12 m	65.7	.606	.479	ESE.	4	7	Nim	61.5	55.5
	3 p. m	65.3	.611	.485	ENE.	3	6	Cir. cum	62.0	57.0
	9 p. m	59.5	.626	.516	ENE.	2	7	Cir. cum	59.0	55.0
31	9 a. m	68.2	29.636	29.503	S.	1	4	Cir. cum	63.0	58.1
	12 m	61.8	.627	.511	NE.	2	8	Cum	64.5	58.5
	3 p. m	60.5	.594	.481	NNE.	2	7	Cir. cum	69.0	60.0
	9 p. m	60.0	.606	.495	.....	0	5	Cir. strat	60.0	54.8
Aug. 1	9 a. m	67.5	29.662	29.532	.....	0	9	Cir. strat	62.0	59.0
	12 m	64.1	.668	.547	NNW.	2	7	Strat	70.1	64.3
	3 p. m	61.5	.668	.554	NNW.	2	7	Strat	70.0	62.0
	9 p. m	62.5	.668	.551	.....	0	9	Cir. nim	62.0	56.2
2	9 a. m	66.8	29.760	29.632	SW.	4	9	Cir. nim	60.0	55.5
	12 m	64.5	.760	.638	SW.	5	10	Nim	58.0	53.0
	3 p. m	69.0	.760	.626	SW.	5	10	Nim	57.5	52.0
	9 p. m	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	9 a. m	61.5	29.664	29.550	NNW.	5	9	Fine rain	61.5	51.7
	12 m	61.1	.688	.575	NNW.	4	8	Nim	57.0	50.5
	3 p. m	61.5	.686	.572	NNW.	4	5	Nim	62.0	53.7
	9 p. m	60.5	.686	.572	NNW.	4	6	Nim	54.0	50.0
4	9 a. m	63.5	29.676	29.557	SW.	3	5	Cir	55.5	47.5
	12 m	63.2	.664	.546	SW.	5	4	Cir	61.5	50.0
	3 p. m	61.8	.620	.505	SW.	5	10	Nim. rain	52.0	48.8
	9 p. m	61.5	.590	.476	SW.	5	10	Nim. rain	51.5	48.5
5	9 a. m	64.0	29.582	29.461	SW.	2	10	Strat	.....	.....
	12 m	63.0	.582	.464	.....	0	9	Strat	.....	.....
	3 p. m	64.0	.582	.461	W.	3	10	Strat. cum	55.0	49.5
	9 p. m	59.5	.594	.485	WSW.	2	9	Nim	51.0	45.5
6	9 a. m	61.8	29.632	29.567	WSW.	3	7	Cir. cum	61.8	51.0
	12 m	61.2	.741	.628	WSW.	3	9	Cir. cum	61.2	49.0
	3 p. m	56.3	.746	.646	SW.	3	9	Cir. cum	56.3	49.5
	9 p. m	57.3	.672	.569	S.	6	9	Nim. rain	57.3	46.5
7	9 a. m	57.8	29.536	29.432	S.	5	2	.....	57.8	48.3
	12 m	58.5	.584	.478	NW.	4	2	Rain	58.5	53.2
	3 p. m	56.3	.642	.542	N.	6	3	Fog and rain	56.3	57.0
	9 p. m	59.0	.716	.609	NW.	5	9	Hard rain	59.0	47.0
8	9 a. m	59.0	29.754	29.647	N.	5	10	Heavy rain	45.0	42.0
	12 m	55.5	.764	.666	N.	5	10	Rain	46.5	42.9
	3 p. m	55.0	29.778	29.680	ENE.	4	4	Cir. cum	56.0	50.2
	9 p. m	54.9	.816	.718	NW.	3	6	Cir. cum	51.0	47.3
9	9 a. m	59.5	29.910	29.800	ENE.	4	3	Cir. cum	59.0	55.0
	12 m	59.5	.910	.800	NE.	4	3	Cir. cum	66.0	64.5
	3 p. m	60.2	.920	.808	NNE.	4	3	Cir. cum	70.0	64.5
	9 p. m	60.0	.931	.820	NNE.	2	3	Strat	57.0	54.5
10	9 a. m	64.0	29.986	29.864	N.	4	3	Cir	58.0	53.5
	12 m	61.5	.984	.869	N.	4	2	Cir	66.0	60.5
	3 p. m	61.0	.966	.872	N.	3	2	Cir	.....	.....

Meteorological observations at Redoubt Saint Michael's—Continued.

Date.	Hour.	Att. thermometer.	Barometer uncorrected.	Barometer reduced to standard and 32° F.	Wind.		Clouds.		Detached thermometers.	
					Direction.	Force.	Amount.	Kind.	Dry.	Wet.
1869.		°							°	°
Aug. 10	9 p. m.	61.7	.986	.880	S.	5	5	Cir	55.5	51.5
11	9 a. m.	63.9	30.020	29.898	S.	2	5	Cir. cum	52.3	48.9
	12 m.	60.9	.018	.904	NW.	2	1	Cir	68.5	63.1
	3 p. m.	63.9	.040	.918	NNW.	3	1	Cir	67.3	62.5
	9 p. m.	61.3	29.992	.877	N.	1	2	Cir	57.9	55.3
12	9 a. m.	64.3	29.906	29.783	N.	2	7	Strat	60.1	55.7
	12 m.	62.9	.876	.757	NE.	5	8	Nim	63.0	59.0
	3 p. m.	64.0	.868	.746	NE.	1	9	Rain	66.5	61.3
	9 p. m.	62.8	.830	.711	N.	4	9	Rain	58.5	55.0
13	9 a. m.	64.0	29.850	29.728	E.	4	9	Strat. cum	59.5	54.5
	12 m.	64.5	.864	.740	SE.	5	9	Strat. cum	63.2	57.0
	3 p. m.	65.5	.872	.746	SSE.	4	9	Cir. strat	65.0	58.5
	9 p. m.	62.7	.890	.771	NE.	1	7	Cir. strat	58.5	55.9
14	9 a. m.	63.0	29.944	29.825	ENE.	5	3	Cum. cir	58.0	53.0
	12 m.	63.2	.970	.850	NE.	4	2	Cum. cir	72.0	65.0
	3 p. m.	62.5	.970	.852	NE.	5	4	Cum. cir	65.5	59.5
	9 p. m.	64.0	.970	.848		0	2	Cum. cir	54.0	50.0
15	9 a. m.	67.0	30.058	29.928		0	3	Cir. cum	64.0	58.0
	12 m.	66.0	.062	.934	NE.	3	3	Cir. cum	69.0	61.0
	3 p. m.	66.0	.062	.934	NE.	3	3	Cir. cum	73.0	65.5
	9 p. m.	62.3	.060	.942		0	3	Cum	58.0	53.5
16	9 a. m.	70.0	30.079	29.941	SW.	2	5	Strat. cir	62.0	55.0
	12 m.	67.5	.070	.938	E.	1	2	Strat. cir	75.5	66.2
	3 p. m.	61.5	.037	.922	NE	3	2	Cum. strat	76.5	67.5
	9 p. m.									
17	9 a. m.	69.0	29.968	29.832	SE.	4	2	Cum. strat	63.7	55.5
	12 m.	69.3	.942	.806	SE.	3	1	Cum. strat	73.3	66.5
	3 p. m.	66.5	.940	.811		0	2	Cum. strat	76.0	68.0
	9 p. m.	63.0	.906	.787	S.	2	8	Strat. nim	62.0	55.8
18	9 a. m.	66.7	29.992	29.863	SE.	5	9	Nim. rain	57.0	52.0
	12 m.	64.0	.990	.868	SE.	6	9	Nim	58.0	52.0
	3 p. m.	66.5	.994	.865	SE.	5	9	Nim	58.0	52.0
	9 p. m.	60.0	.756	.646	NE.	6	10	Nim. rain	57.0	52.5
19	9 a. m.	62.5	29.520	29.403	SE.	7	10	Nim.; light fog	55.5	50.0
	12 m.	61.0	.548	.435	S.	8	10	Drizzly rain	54.3	50.0
	3 p. m.	63.0	.620	.502	SW.	6	9	Nim. cum	56.3	51.0
	9 p. m.	63.5	.700	.581	S.	6	10	Nim	53.0	49.5
20	9 a. m.	64.0	29.872	29.750	S.	5	10	Nim	53.5	50.0
	12 m.	63.3	.924	.804	S.	5	10	Nim. strat	54.3	50.5
	3 p. m.	62.7	.930	.811	SE.	5	10	Strat. cum	55.0	50.5
	9 p. m.	60.5	.918	.805	SE.	5	10	Strat. cum	52.8	49.3
21	9 a. m.	58.7	29.834	29.726	SSW.	2	10	Fine rain	53.0	49.9
	12 m.	61.5	.910	.795	SSW.	4	7	Fine rain	55.0	50.3
	3 p. m.	64.0	.942	.820	SW.	3	7	Fine rain	56.3	52.0
	9 p. m.	60.7	30.064	.951	SW.	3	10	Fine rain	52.0	48.5
22	9 a. m.	61.7	30.250	30.134	SW.	3	9		49.0	45.3
	12 m.	62.3	.254	.136	SW.	2	5		54.3	50.0
	3 p. m.	63.0	.262	.143	SW.	2	5		58.5	53.0
	9 p. m.	63.7	.260	.139	ENE.	3	6		55.0	51.0
23	9 a. m.	64.5	30.195	30.071	E.	2	10	Nim	54.3	49.3
	12 m.	64.2	.140	.017	ESE.	3	10	Nim. strat	57.5	51.5
	3 p. m.	61.2	.068	29.953	NNE.	4	10	Strat	59.0	53.0
	9 p. m.	60.0	29.898	.787	NE.	6	10	Strat	57.5	53.0
24	9 a. m.	63.8	29.796	29.674	N.	6	10	Nim. rain	57.5	54.0
	12 m.	64.0	.796	.674	N.	4	10	Strat	58.5	54.5
	3 p. m.	64.0	.796	.674	N.	2	10	Strat	61.0	56.0
	9 p. m.	65.0	.858	.733	SW.	3	10	Nim	52.0	47.5
25	9 a. m.	64.0	29.868	29.746	SE.	3	10	Strat	51.6	46.2
	12 m.	62.2	.866	.749	SE.	2	10	Strat	58.8	49.6
	3 p. m.	62.5	.816	.699		0	10	Strat.; nim. fog	54.8	51.0
	9 p. m.	60.8	.812	.698		0	8	Cir. strat	52.0	47.8
26	9 a. m.	66.0	29.886	29.758	S.	1	4	Cum. cir	55.0	50.0
	12 m.	64.5	.910	.786	WSW.	3	7	Cum. nim. cir	56.0	52.5
	3 p. m.	64.8	.910	.786	WSW.	3	10	Cum. nim. cir	56.5	52.0
	9 p. m.	64.2	.934	.811	WSW.	4	10	Cum. cir	52.0	47.2
27	9 a. m.	64.0	29.978	29.856	S.	2	8	Cum. nim	54.0	49.0
	12 m.	59.2	.978	.869	SE.	3	9	Cum	58.0	53.0
	3 p. m.	60.0	.976	.865	W.	2	10	Nim	57.0	51.0
	9 p. m.	64.8	.972	.848	SW.	3	9	Strat	53.0	49.0
28	9 a. m.	62.5	29.938	29.820	SE.	4	9	Nim	53.5	49.5
	12 m.	62.5	.930	.812	N.	3	9	Strat. nim	56.2	51.8
	3 p. m.	59.0	.870	.761	WNW.	4	8	Strat. cir. nim	57.2	52.8
	9 p. m.	59.0	.770	.662	WNW.	3	9	Strat. cir. nim	53.0	49.5
29	9 a. m.	58.0	29.664	29.559	ENE.	5	9	Strat. nim	53.0	49.0
	12 m.	59.0	.606	.499	ENE.	5	10	Strat. nim	56.8	51.0
	3 p. m.	58.5	.576	.470	E.	6	9	Strat	56.5	50.5
	9 p. m.	59.0	.566	.459	ENE.	6	9	Strat	53.5	49.0
30	9 a. m.	59.0	29.586	29.429	NE.	5	9	Nim	54.0	50.5
	12 m.	60.2	.528	.417	NE.	3	10	Nim	57.0	53.5
	3 p. m.	61.8	.564	.439	ENE.	2	10	Fog	57.0	53.0
	9 p. m.	60.0	.566	.456	ENE.	3	10	Nim. rain	56.0	52.0
31	9 a. m.	60.5	29.500	29.389	E.	6	9	Nim. cum	55.7	51.0
	12 m.	62.0	.502	.387	ESE.	6	10	Nim.; rain-squalls	56.0	53.0
	3 p. m.	63.0	.508	.390	ESE.	5	9	Strat. nim	57.0	50.5
	9 p. m.	62.0	.534	.416	S.	3	9	Strat. nim	53.5	48.0
Sep 1	9 a. m.	65.0	29.540	29.417	SSE.	3	10	Nim		
	12 m.	64.0	.540	.419	SSW.	4	9	Strat. nim		
	3 p. m.	65.0	.544	.421	SW.	2	5	Cir. strat	56.0	48.0
	9 p. m.	60.0	.618	.508	SW.	4	6	Cum. strat	50.0	45.2
2	9 a. m.	57.0	29.728	29.626	SSE.	7	8	Cum. cir	52.0	46.0
	12 m.	60.0	.760	.650	SSE.	6	9	Cum. cir. nim.; rain	52.0	46.5

Meteorological observations at Redoubt Saint Michael's—Continued.

Date.	Hour.	Att. thermometer.	Barometer uncorrected.	Barometer reduced to standard and 32° F.	Wind		Clouds.		Detached thermometers.	
					Direction.	Force.	Amount.	Kind.	Dry.	Wet.
		°							°	°
1869.										
Sept. 2	3 p. m	59.2	.818	.709	S.	5	10	Cum. cir.; rain-squalls	52.0	47.5
	9 p. m	60.0	.828	.717	SE.	4	9	Cum. nim	51.0	47.0
3	9 a. m	57.5	29.900	29.795	ESE.	6	4	Cum. cir	50.0	45.0
	12 m	56.0	.854	.758	ENE.	5	6	Cum. cir	55.8	50.0
	3 p. m	56.2	.758	.657	ENE.	7	8	Cum. cir	55.8	48.8
	9 p. m	55.0	.524	.526	ENE.	7	10	Cum. nim.; rain	52.5	47.0
4	9 a. m	57.0	29.336	29.233	NE. by E.	5	10	Nim.; fine rain	53.5	49.0
	12 m	58.0	.348	.242	NE. by E.	5	10	Scotch mist	55.0	50.5
	3 p. m	59.5	.402	.292	ESE.	6	10	Scotch mist	54.0	50.0
	9 p. m	58.8	.604	.496	SE.	6	10	Cum. nim	51.0	46.0
5	9 a. m	60.0	29.726	29.616	ESE.	4	7	Cir. strat. nim	52.5	47.0
	12 m	59.5	.766	.657	ESE.	4	4	Cir. strat	56.2	49.0
	3 p. m	61.5	.766	.652	SW.	2	6	Cir. cum	55.0	49.5
	9 p. m									
7	9 a. m	60.3	29.792	29.680	SW.	3	9	Cum. nim	49.3	44.0
	12 m	61.5	.956	.841	SW.	3	9	Cum. cir	50.2	46.3
	3 p. m	59.8	.968	.857	W.	3	4	Cir. cum	52.0	45.5
	9 p. m									
8	9 a. m									
	12 m	60.0	29.900	29.789	NE.	2	5	Cir. cum	54.5	48.0
	3 p. m	58.5	.758	.651	NE.	3	4	Cir. cum	55.0	48.0
	9 p. m	58.5	.820	.713	NE.	4	4	Cir. cum	48.0	42.0
9	9 a. m	57.5	29.754	29.651	NE. by E.	4		Clear sky	49.0	43.0
	12 m	56.0	.700	.600	NE. by E.	5	2	Cir. cum	56.0	48.0
	3 p. m	57.0	.690	.588	ENE.	5	5	Cum. cir	48.0	48.0
	9 p. m	59.5	.688	.579	SE.	4	10	Cum. nim.; rain	51.0	46.0
10	9 a. m	60.0	29.704	29.594	SE.	2	8	Strat. cir	52.2	47.5
	12 m	56.0	.712	.612	ESE.	4	7	Strat. cir	53.0	48.0
	3 p. m	57.0	.728	.626	ESE.	3	9	Strat	54.0	49.0
	9 p. m	63.0	.726	.608	ESE.	4	9	Strat	52.5	47.0
11	9 a. m	61.5	29.692	29.578	ENE.	1	9	Strat. nim	51.5	48.0
	12 m	58.5	.690	.584	NNE.	4	5	Strat. nim	58.5	53.0
	3 p. m	58.0	.690	.585	N.	4	4	Strat. nim	56.5	50.5
	9 p. m	58.0	.662	.557	N.	5	7	Strat. nim	51.5	49.5
12	9 a. m	57.0	29.684	29.582	NNW.	5	6	Cum. cir	54.0	49.0
	12 m	57.5	.604	.501	N.	4	7	Cum. cir	55.0	49.5
	3 p. m	58.0	.516	.411		0	6	Cum. cir	55.0	49.5
	9 p. m	60.5	.600	.289		0	7	Cum	50.0	45.5
13	9 a. m	58.5	29.776	29.699	SE.	3	10	Cum. nim	50.0	45.0
	12 m	58.5	.772	.665		0	9	Cum. nim	51.0	45.5
	3 p. m	58.0	.884	.728	SW.	2	9	Cum. nim	50.3	44.7
	9 p. m	59.5	.870	.760	NE.	1	3	Cum. nim	48.5	43.5
14	9 a. m	57.5	29.638	29.535	NE.	1		Clear sky	50.3	45.5
	12 m	57.5	.604	.501	NE.	4		Clear sky	60.3	53.5
	3 p. m	56.5	.516	.415	NE.	2	4	Cum. cir	58.0	52.0
	9 p. m	61.5	.600	.486	NE.	2	5	Cum. cir	52.0	48.3
15	9 a. m	52.7	29.776	29.685	N.	6	8	Nim. cum	49.0	43.5
	12 m	52.3	.772	.682	N.	5	6	Nim. cum. cir	50.0	45.0
	3 p. m	54.0	29.834	29.739	NW.	3	9	Nim. cum	48.5	42.0
	9 p. m	53.2	.870	.777	S.	5	9	Nim. cum	44.0	39.0
16	9 a. m	52.0	30.070	29.980	SSE.	4	9	Nim	46.5	42.0
	12 m	51.7	.074	.985	SW.	1	10	Nim	47.0	43.0
	3 p. m	52.0	.080	.990	S.	3	10	Nim	47.7	43.5
	9 p. m	54.8	.076	.978	S.	4 or 5	10	Nim	46.2	42.0
17	9 a. m	55.3	29.962	29.863	SSE.	3	9	Cum. nim	48.3	44.2
	12 m	56.2	.966	.865	SSW.	3	7	Cum. nim	50.0	45.0
	3 p. m	58.0	.966	.860	SSW.	3	6	Cir. cum	50.0	45.0
	9 p. m	61.2	.966	.851	SSW.	2	4	Cir. cum	48.0	43.0
18	9 a. m	59.0	30.062	29.958	S.	3	8	Cum. nim	50.0	45.0
	12 m	59.0	.070	.961	NNE.	3	4	Cir. cum	52.5	47.0
	3 p. m	58.0	.074	.968	NNE.	4 or 5	1	Cir	52.0	46.0
	9 p. m									
19	9 a. m	57.0	29.962	29.879	ENE.	4	4	Cir. strat	48.0	42.0
	12 m	57.0	.990	.887	E.	3	7	Strat. nim	52.0	46.0
	3 p. m	58.5	30.004	.897		0	9	Nim.; light mist	53.0	47.0
	9 p. m	60.0	.004	.893	SE.	2	10	Nim.; rain	50.0	44.0
20	9 a. m	59.0	29.960	29.851	NE.	3	9	Strat. nim	50.5	46.0
	12 m	58.0	.900	.794	NE.	4	9	Strat	53.5	47.5
	3 p. m	57.0	.892	.789	NE.	5	8	Strat. cir	53.5	46.5
	9 p. m	59.0	.886	.777	NE.	5	2	Cir	49.8	45.0
21	9 a. m	57.5	29.822	29.717	NE.	5	8	Cum. cir	49.7	43.3
	12 m	58.0	.814	.708	NE.	5	7	Cum. cir	52.3	47.5
	3 p. m	61.0	.808	.694	NE.	4	9	Cum. cir	52.0	46.5
	9 p. m	56.5	.808	.706	NE.	1	7	Cum	50.5	46.0
22	9 a. m	54.8	29.860	29.762	NE.	1	7	Strat. nim	51.0	45.7
	12 m	55.3	.854	.785	N.	2	6	Strat. nim	54.5	48.7
	3 p. m	56.3	.888	.786	N.	1	7	Nim	54.0	48.0
	9 p. m	55.5	.914	.815	N.	2	6	Nim	49.7	45.5
23	9 a. m	53.3	29.960	29.866	SE.	4	9	Strat. cir	47.5	43.5
	12 m	53.7	.964	.869	S.	3	5	Strat. cir	52.5	46.3
	3 p. m	55.6	.966	.893	S.	4	6	Cir. strat	51.3	45.4
	9 p. m	57.3	.968	.863	S.	3	7	Cir	48.0	42.5
24	9 a. m	63.3	29.906	29.786	SE.	3	7	Cir	51.0	46.0
	12 m	62.7	.860	.741	S.	2	6	Cum. cir	52.0	46.5
	3 p. m	61.5	.758	.638	N.	2	7	Cum. cir.; light baffling wind.	52.0	47.0
	9 p. m	62.5	.634	.516	NNW.	1	8	Cum. nim.; rain-squalls	48.0	43.0
25	9 a. m	60.0	29.526	29.415	NE.	2	0	Clear sky	50.0	45.0
	12 m	60.0	.524	.413	NE.	3	0	Clear sky	54.0	48.0
	3 p. m	62.0	.520	.408	NNE.	5	1	Cir. cum	51.5	44.5
	9 p. m									

Meteorological observations at Redoubt Saint Michael's.

Date.	Hour.	Att. therm.		Reading of barometer No. 1613.	Reading of barometer No. 1609.	Wind.		Clouds.		Detached thermometers.	
		1613.	1609.			Direction.	Force.	Amount.	Kind.	Dry.	Wet.
1869.		°	°							°	°
Sept. 26	9 a. m	60.0	.....	29.630	.....	NNE.	4	2	Strat. cir	47.0	41.0
	10.5 a. m	55.5	56.5	.645	29.632	NNE.	3	2	Strat. cir	52.0	45.0
	11.5 a. m	57.0	58.5	.653	.644	NNE.	3	2	Strat. cir	52.5	45.0
	12 5 p. m	55.0	55.5	.652	.630	NNE.	3	2	Strat. cir	53.0	45.5
	1.5 p. m	53.5	54.2	.650	.630	NNE.	3	2	Strat. cir	53.0	45.5
	2 p. m	55.5	56.5	.650	.638	NNE.	2	2	Strat. cir	53.0	45.5
	3 p. m	55.5	57.0	.659	.651	NNE.	4	2	Cir. strat	53.5	45.5
	4 p. m	53.5	54.5	.663	.650	NNE.	4	2	Cir. strat	52.5	46.0

Meteorological observations at Fort Yukon, Alaska.

[Cistern barometer No. 1609, and thermometers, by James Green, New York—Observers, Mr. J. J. Major and Private Michael Foley, United States Army.]

Date.	Time.	Thermometers.				Barometer uncorrected.	Barometer reduced to standard and 32° F.	Wind.		Clouds.	
		Under cover.		Open air.				Direction.	Force.	Amount.	Kind.
		Att.	Det.	Dry.	Wet.						
1869.	*h. m.*	°	°								
Aug. 3	9 00 a. m	62.0	65.0	.....	.....	29.011	28.910	.....	0	8	Nim.; rain.
	3 00 p. m	65.0	68.5	.....	.....	28.971	.862	.....	0	8	Nim.
	6 00 p. m	64.0	68.0	.....	.....	.963	.857	SE.	1	7	Nim.; rain at intervals.
Aug. 4	10 00 a. m	60.0	63.0	.....	.....	29.020	28.924	NW.	2	8	Nim.
	2 00 p. m	60.0	63.0	.....	.....	.024	.928	NW.	2	8	Nim.
	7 00 p. m	60.0	63.0	.....	.....	28.996	.900	NW.	2	8	Nim.
Aug. 5	10 00 a. m	60.0	63.0	.....	.....	29.004	28.908	NW.	2	8	Nim.
	12 00 m	59.0	64.0	.....	.....	.064	.971	W.	1	6	Cum. nim.
	3 00 p. m	63.0	67.0	.....	.....	.077	.974	W.	1	4	Cum. nim.
	4 00 p. m	72.0	67.5	.....	.....	.089	.962	W.	1	4	Cum.
	6 00 p. m	62.0	67.0	.....	.....	.074	.973	.....	0	3	Cum. strat.
Aug. 6	9 00 a. m	59.0	62.0	.....	.....	29.155	29.062	.....	0	7.5	Cum. strat.
	11 00 a. m	60.0	64.0	.....	.....	.166	.070	.....	0	5	Cum. strat.
	3 30 p. m	64.0	69.5	.....	.....	.181	.075	.....	0	5	Cum. strat.
Aug. 7	6 45 a. m	57.5	60.5	.....	.....	29.332	29.259	NW.	2	7	Cum. nim. strat.
	7 00 a. m	57.5	60.5	.....	.....	.333	.213	NW.	2	7	Cum. nim. strat.
	7 30 a. m	59.0	62.0	.....	.....	.340	.246	NW.	2	7	Cum. nim. strat.
	8 00 a. m	59.5	62.5	.....	.....	.341	.245	W.	1	5	Cum. strat.
	8 30 a. m	59.0	62.0	.....	.....	.353	.259	W.	1	5	Cum. strat.
	9 00 a. m	59.0	62.0	.....	.....	.353	.259	W.	1	5	Cum. strat.
	12 00 m	60.0	63.0	.....	.....	.326	.229	E.	1	5	Cir. cum.
	2 00 p. m	64.5	68.0	.....	.....	.312	.203	SW.	1	3	Cir. cum.
	3 00 p. m	64.0	67.5	.....	.....	.300	.192	.....	0	4	Cir. cum.
	4 00 p. m	65.0	67.0	.....	.....	.274	.164	.....	0	4	Cir. cum.
	5 00 p. m	68.0	67.0	.....	.....	.216	.098	.....	0	4	Cir. cum.
	6 00 p. m	66.0	67.0	.....	.....	.206	.153	.....	0	4	Cir. cum.
	7 00 p. m	64.0	67.0	.....	.....	.254	.146	.....	0	4	Cir. cum.
Aug. 8	9 00 a. m	58.0	61.0	.....	.....	29.339	29.247	S.	1	3	Light fleecy clouds.
Aug. 9	10 00 a. m	61.0	65.0	.....	.....	29.501	29.401	SW.	1	5	Cir. strat.
	11 00 a. m	62.0	66.0	.....	.....	.501	.399	SW.	1	4	Cir. strat.
	3 00 p. m	67.5	73.0	.....	.....	.495	.378	NE.	1	4	Cir. strat.
	4 00 p. m	72.5	73.0	.....	.....	.494	.364	NE.	1	3	Cir. strat.
	8 00 p. m	66.0	71.0	.....	.....	.488	.375	.....	0	2	Cir. strat.
Aug. 10	8 00 a. m	58.0	62.0	.....	.....	29.510	29.418	N.	1	1	Cir. strat.; light and fleecy.
	9 30 a. m	60.5	64.0	.....	.....	.514	.416	N.	2	1	Cir. strat.; light and fleecy.
Aug. 11	11 00 a. m	60.0	64.0	.....	.....	29.550	29.453	N.	2	5	Cir. strat.
Aug. 12	11 00 a. m	60.0	64.0	.....	.....	29.575	29.478	.....	0	1	Cum.
	12 00 m	61.0	65.0	.....	.....	.564	.464	W.	1	0	
	3 00 p. m	64.0	70.0	.....	.....	.563	.455	W.	1	3	Cum.
	6 00 p. m	65.0	73.0	.....	.....	.530	.420	W.	1	3	Cum.
Aug. 13	9 00 a. m	60.0	63.0	.....	.....	29.556	29.459	W.	1	3	Cum.
	11 00 a. m	61.0	65.5	.....	.....	.552	.452	.....	0	1	Cum.
	12 00 m	62.0	67.0	.....	.....	.551	.449	S.	1	1	Cum.
	1 00 p. m	64.0	69.0	.....	.....	.546	.438	S.	1	1	Cum.
	2 00 p. m	65.0	71.0	.....	.....	.536	.426	S.	1	1	Cum.
	3 00 p. m	65.0	72.0	.....	.....	.536	.426	S.	1	1	Cum.
	4 00 p. m	67.0	74.0	.....	.....	.536	.421	S.	1	1	Cum.
	4 15 p. m	67.0	75.0	.....	.....	.532	.417	S.	1	1	Cum.
	5 00 p. m	67.0	74.0	.....	.....	.524	.409	S.	1	1	Cum.
	6 00 p. m	67.0	74.0	.....	.....	.526	.411	S.	1	1	Cum.
	7 00 p. m	66.0	72.0	.....	.....	.536	.423	S.	1	1	Cum.
	8 00 p. m	65.0	70.0	.....	.....	.526	.416	S.	1	1	Cum.
	9 30 p. m	63.0	67.0	.....	.....	.526	.421	S.	1	1	Cum.
Aug. 14	9 30 a. m	61.0	65.5	.....	.....	29.546	29.446	.....	0	0	
	10 00 a. m	62.0	65.5	.....	.....	.544	.442	.....	0	0	
	11 00 a. m	62.0	65.0	.....	.....	.534	.432	.....	0	0	
	12 00 m	64.0	68.0	.....	.....	.534	.426	.....	0	0	
	1 00 p. m	65.0	71.0	.....	.....	.534	.424	SW.	1	1	Cum.
	2 00 p. m	67.0	73.5	.....	.....	.542	.427	SW.	1	1	Cum.
	3 00 p. m	67.0	73.5	.....	.....	.540	.425	.....	0	0	
	4 00 p. m	67.5	75.0	.....	.....	.538	.421	.....	0	0	

Meteorological observations at Fort Yukon—Continued.

Date.	Time.	THERMOMETERS. Under cover. Att.	Under cover. Det.	Open air. Dry.	Open air. Wet.	Barometer uncorrected.	Barometer reduced to standard and 32° F.	Wind. Direction.	Wind. Force.	Clouds. Amount.	Clouds. Kind.
	h. m.	°	°	°	°						
1869.											
Aug. 14	5 00 p. m ...	69.0	75.0	.....	.....	.536	.415	.....	0	0	
	6 00 p. m ...	68.0	75.0	.....	.....	.534	.416	.....	0	0	
	7 00 p. m ...	66.0	72.0	.....	.....	.526	.413	.....	0	0	
	8 00 p. m ...	65.0	70.0	.....	.....	.536	.426	.....	0	0	
	9 00 p. m ...	65.0	70.0	.....	.....	.516	.406	SW.	1	1	Cum.; light and fleecy.
Aug. 15	9 30 a. m ...	62.5	66.0	.....	.....	29.603	29.499	W.	1	1	Cir. strat.
	10 30 a. m ...	64.0	67.0	.....	.....	.664	.556	W.	1	1	Cir. strat.
	11 00 a. m ...	64.0	67.0	70.0	59.7	.662	.554	W.	1	1	Cir. strat.
	12 45 p. m ...	65.0	71.0	79.0	63.0	.664	.554	W.	1	1	Cir. strat.
	2 00 p. m ...	66.0	73.0	84.0	62.5	.603	.492	W.	1	1	Cir. strat.
	3 00 p. m ...	68.0	75.0	82.5	64.0	.586	.468	W.	1	1	Cir. strat.
	4 00 p. m ...	68.0	75.0	82.0	62.5	.584	.466	W.	1	1	Cir. strat.
	5 00 p. m ...	68.0	75.0	81.5	62.5	.576	.458	W.	1	1	Cir. strat.
	6 00 p. m ...	68.0	75.0	81.5	63.5	.576	.458	W.	1	1	Cir. strat.
	7 00 p. m ...	67.0	72.5	72.0	59.0	.576	.461	W.	1	1	Cir. strat.
	8 00 p. m ...	67.0	71.0	66.5	57.3	.576	.461	W.	1	1	Cir. strat.
	9 00 a. m ...	61.0	64.4	59.8	55.0	29.664	29.564	W.	1	5	Cum.
Aug. 16	10 00 a. m ...	63.0	66.4	67.8	59.2	.664	.559	SE.	1	3	Cum. cir. strat.
	11 00 a. m ...	64.0	66.4	71.1	61.4	.606	.498	SE.	1	2	Cir. strat.
	12 00 m	65.0	70.0	71.6	62.0	.554	.444	E.	1	2	Cir. strat
	1 00 p. m ...	66.0	71.0	78.0	60.7	.546	.433	E.	1	1	Cir. strat.
	2 00 p. m ...	66.4	71.0	80.7	62.5	.576	.462	E.	1	2	Cir. strat.
	3 00 p. m ...	67.5	73.0	82.5	64.0	.566	.449	E.	1	2	Cir. strat.
	4 00 p. m ...	69.0	75.0	85.6	66.2	.556	.435	E.	1	2	Cir. strat.
	5 00 p. m ...	69.4	76.0	81.5	64.5	.556	.434	E.	1	2	Cir. strat.
	6 00 p. m ...	69.0	76.0	79.5	62.4	.546	.425	E.	1	3	Light fleecy clouds.
	7 00 p. m ...	67.3	72.0	65.2	61.7	.554	.438	SE.	2	5	Cum. cir. strat.
	8 00 p. m ...	64.0	69.0	61.4	54.7	.556	.448	SE.	1	5	Cum.
	9 00 p. m ...	64.0	69.0	60.7	55.4	.546	.425	E.	1	5	Cum.
Aug. 17	10 00 a. m ...	61.0	64.0	71.8	63.0	29.556	29.456	E.	1	1	Cir. strat.
	11 00 a. m ...	63.0	67.0	71.8	60.4	.554	.449	E.	1	1	Cir. strat.
	12 00 m	65.0	69.0	71.6	62.2	.552	.442	E.	1	1	Cir. strat.
	1 00 p. m ...	67.0	73.0	78.0	62.5	.546	.431	E.	1	1	Cir. strat.
	2 00 p. m ...	67.0	73.0	82.6	65.4	.544	.429	E.	1	2	Cum. cir. strat.
	3 00 p. m ...	68.0	75.0	81.5	63.2	.534	.416	E.	1	2	Cum. cir. strat.
	4 00 p. m ...	73.0	76.0	84.7	65.0	.536	.409	E.	1	3	Cum. cir. strat.
	5 00 p. m ...	87.0	76.0	88.0	66.2	.544	.376	E.	1	2	Cir. strat.
	6 00 p. m ...	84.0	77.0	82.3	65.5	.536	.376	E.	1	2	Cir. strat.
	7 00 p. m ...	73.0	77.0	71.5	63.4	.516	.385	SW.	1	1	Cir. strat.
	8 00 p. m ...	66.0	71.0	64.5	61.6	.446	.333	SW.	1	2	Cir. strat.
	10 00 p. m ...	65.0	69.0	56.0	53.4	.446	.336	SW.	1	1	Cir. strat.
Aug. 18	9 00 a. m ...	61.0	65.0	62.5	54.4	29.456	29.456	E.	1	2	Cir. strat.
	10 30 a. m ...	63.0	67.0	73.0	60.5	.566	.461	E.	1	1	Cir. strat.
	11 00 a. m ...	64.0	67.0	71.2	62.0	.574	.466	E.	1	1	Cir. strat.
	12 00 m	65.0	70.0	76.5	61.2	.576	.466	E.	1	2	Cir. strat.
	1 00 p. m ...	66.0	72.0	78.0	63.0	.574	.461	E.	1	1	Cir. strat.
	2 00 p. m ...	68.0	74.0	82.5	63.0	.576	.458	E.	1	2	Light fleecy clouds.
	3 00 p. m ...	70.0	75.0	82.0	62.5	.564	.441	E.	1	3	Cum.
	4 00 p. m ...	65.4	66.0	85.0	64.7	.564	.453	E.	1	3	Cum.
	5 00 p. m ...	70.0	76.0	87.0	65.0	.554	.431	E.	1	4	Cum.
	6 00 p. m ...	69.0	74.0	75.4	62.5	.564	.443	SW.	1	4	Cum.
	7 00 p. m ...	68.0	73.0	70.6	61.0	29.546	29.428	SW.	1	4	Cum.
	8 00 p. m ...	67.0	72.0	65.5	59.5	.546	.431	N.	1	4	Cum. cir. strat.
	9 00 p. m ...	66.0	71.0	61.7	59.0	.544	.431	N.	1	4	Cum. cir. strat.
Aug. 19	8 00 a. m ...	59.0	62.0	57.0	53.0	29.414	29.320	E.	1	2	Cum. cir. strat.
	9 00 a. m ...	61.0	64.0	64.0	55.6	.346	.246	N.	1	4	Cum. cir. strat.
	10 30 a. m ...	64.0	67.0	71.3	60.0	.324	.216	E.	1	5	Cum. cir. strat.
	11 00 a. m ...	64.0	68.0	71.5	58.5	.314	.206	E.	1	5	Cum. cir. strat.
	12 00 m	65.0	68.0	70.6	62.7	.346	.236	SW.	1	5	Cum.
	1 00 p. m ...	66.0	69.0	72.2	60.5	.344	.231	S.	1	5	Cum. cir. strat.
	2 00 p. m ...	67.0	70.0	71.5	59.4	.326	.223	S.	1	7	Cum. cir. strat.
	3 00 p. m ...	66.0	69.0	69.0	63.0	.326	.211	SW.	1	7	Cum. cir. strat.
	4 00 p. m ...	67.0	70.0	67.5	58.5	.324	.209	SW.	1	7	Cum.
	5 00 p. m ...	67.0	69.0	65.6	55.5	.326	.211	SW.	2	7	Cum.
	6 00 p. m ...	65.0	68.0	63.0	54.0	324	.214	SW.	2	7	Cir. strat.; little rain.
	7 00 p. m ...	64.0	67.0	58.0	54.2	.355	.247	SW.	1	7	Cir. strat.; little rain.
	8 00 p. m ...	63.0	65.0	57.5	53.0	.353	.248	SW.	2	7	Cir. strat.; little rain.
Aug. 20	8 00 a. m ...	59.0	61.0	54.0	49.5	29.415	29.321	SW.	2	4	Cum. cir. strat.
	9 00 a. m ...	60.0	62.0	56.2	51.3	.414	.317	SW.	2	4	Cum. cir. strat.
	10 00 a. m ...	61.0	63.0	57.0	52.0	.425	.325	SW.	2	4	Cum. cir. strat.
	11 00 a. m ...	65.0	63.0	58.5	51.2	.416	.306	SW.	2	5	Cum. cir. strat.
	12 00 m	66.5	66.0	62.0	52.3	.425	.311	SW.	2	5	Cum. cir. strat.
	1 00 p. m ...	67.0	66.0	60.0	52.0	.425	.310	SW.	3	7	Cum. cir. strat.
	2 00 p. m ...	62.0	65.0	62.0	53.5	.423	.321	SW.	3	7	Cum. cir. strat.
	3 00 p. m ...	68.0	67.0	61.0	52.0	.425	.307	SW.	3	7	Cum. cir. strat.
	4 00 p. m ...	63.0	69.0	63.0	53.5	.425	.320	SW.	3	7	Cum. cir. strat.
	5 00 p. m ...	64.0	67.0	59.5	51.5	.436	.328	SW.	3	7	Cum. cir. strat.
	6 00 p. m ...	69.0	66.0	63.5	53.5	.425	.304	SW.	2	7	Cum. cir. strat.
	7 00 p. m ...	62.0	65.0	55.4	50.2	.447	.345	SW.	2	7	Cum. cir. strat.
	8 00 p. m ...	62.0	65.0	54.0	49.2	.458	.356	SW.	2	7	Cum. cir. strat.
Aug. 21	9 00 a. m ...	58.0	61.0	56.5	52.6	29.475	29.383	SW.	2	7	Cum. cir. strat.
	10 00 a. m ...	60.0	62.0	58.7	52.5	.476	.379	SW.	2	7	Cum. cir. strat.
	11 00 a. m ...	61.0	63.0	58.0	51.7	.450	.350	SW.	3	7	Cum. cir. strat.
	12 00 m	61.0	63.0	59.7	53.5	.405	.295	SW.	1	7	Cum. cir. strat.
	1 00 p. m ...	61.0	63.0	61.5	54.5	.446	.346	SW.	1	6	Cum. cir. strat.
	2 00 p. m ...	62.0	65.0	61.4	53.0	.487	.385	SW.	2	7	Cum. cir. strat.
	3 00 p. m ...	63.0	65.0	67.0	52.6	.486	.381	SW.	1	7	Cum. cir. strat.
	3 30 p. m ...	66.0	67.0	64.7	54.5	.435	.322	SW.	2	6	Cum. cir. strat.
	4 00 p. m ...	72.0	67.0	62.5	57.4	.497	.368	SW.	2	5	Cum. cir. strat.
	7 00 p. m ...	64.0	67.0	59.5	52.6	.485	.377	SW.	2	4	Cum. cir. strat.
	8 00 p. m ...	66.0	65.0	56.0	51.1	.436	.323	SW.	1	4	Cum. cir. strat.

Meteorological observations at Fort Yukon—Continued.

Date.	Time.	Thermometers. Under cover. Att.	Under cover. Det.	Open air. Dry.	Open air. Wet.	Barometer uncorrected.	Barometer reduced to standard and 32° F.	Wind. Direction.	Wind. Force.	Clouds. Amount.	Clouds. Kind,
1869.	h. m.	°	°	°	°						
Aug. 21	9 00 p. m ...	61.0	64.0	53.5	58.0	.445	.345	SW.	1	3	Cum. cir. strat.
Aug. 22	10 30 a. m ...	59.0	61.0	58.2	52.4	29.665	29.571	SW.	2	7	Cum. cir. strat.
	11 00 a. m ...	61.0	63.0	58.0	52.5	.685	.565	SW.	2	7	Cum. cir. strat.
	12 00 m ...	61.0	63.0	58.2	52.5	.674	.574	SW.	3	7	Cum. cir. strat.
	1 00 p. m ..	61.0	63.0	59 0	51.3	.625	.525	SW.	2	7	Cum. cir. strat.
	2 00 p. m ...	61.0	65.0	62.7	53.7	.625	.525	SW.	2	5	Cum. cir. strat.
	3 00 p. m ...	65.0	69.0	65.5	56.2	.635	.525	SW.	2	5	Cum. cir. strat.
	4 00 p. m ..	66.0	67.0	63.0	59.6	.645	.532	SW.	2	5	Cum. cir. strat.
	5 00 p. m ...	71.0	69.0	63.5	56.0	.655	.529	SW.	2	6	Cum. cir. strat.
	6 00 p. m ...	76.0	69.0	65.0	55.4	.635	.496	SW.	2	4	Cum. cir. strat.
	7 00 p. m ...	65.0	67.0	58.2	52.0	.615	.505	SW.	2	4	Cum. cir. strat.
	8 00 p. m ..	61.0	65.0	55.2	51.1	.615	.515	SW.	2	5	Cum. cir. strat.
Aug. 23	7 00 a. m ...	57.0	59.0	49.5	47.0	29.764	29.675	SW.	2	2	Cum. cir. strat.
	8 00 a. m ...	56.0	59.0	51.0	50.4	.715	.628	SW.	2	2	Cum. cir. strat.
	9 00 a. m ..	58.0	60.0	55.2	49.3	.765	.673	SW.	2	1	Cum. cir. strat.
	10 30 a. m ..	59.0	61.0	60.7	53.2	.756	.662	SW.	2	4	Cum. cir. strat.
	11 00 a. m	59.0	62.0	62.5	53.6	.756	.662	SW.	2	4	Cum. cir. strat.
	12 00 m	60.0	65.0	65.2	55.3	.745	.648	E.	1	3	Cum. cir. strat.
	1 00 p. m ..	62.0	68.0	03.7	58.0	.736	.634	SW.	1	3	Cum. cir. strat.
	2 00 p. m ..	63.0	68.0	71 0	58 5	.736	.631	SW.	1	4	Cum. cir. strat.
	3 00 p. m ...	65.0	69.0	72.0	56.0	.725	.615	SW.	1	4	Cum. cir. strat.
	4 00 p. m ...	64.0	69.0	66.2	58.2	.715	.602	SW.	1	4	Cum. cir. strat.
	5 00 p. m ...	66.0	68.0	65.0	56.7	.695	.582	W.	1	5	Cum. cir. strat.
	6 00 p. m ...	63 0	66.0	63.4	54.0	.675	.570	W.	1	6	Cum. cir. strat.
Aug. 24	9 00 a. m ..	56 0	59.0	55.0	51.0	29.437	29.350	E.	1	2	Cum. cir. strat.
	10 00 a. m ..	58.0	60.0	61.0	52.0	.426	.334	E.	1	2	Cum. cir. strat.
	11 00 a. m	60.0	63.0	64.3	56.5	.415	.318	E.	1	2	Cum. cir. strat.
	12 00 m	61.0	65.0	68.4	55.4	.453	.353	N.	1	2	Cum. cir. strat.
	1 00 p. m ...	62.0	66.0	65.0	55.0	.396	.294	N	1	3	Cum. cir. strat.
	2 00 p. m ...	63.0	67.0	68 2	54.5	.376	.271	E.	1	4	Cum. cir. strat.
	3 30 p. m ...	61.0	65.0	64.0	55.0	.356	.256	E.	1	4	Cum. cir. strat.
	4 00 p. m ...	62.0	65.0	64.3	55.4	.346	.244	E.	1	6	Cum. cir. strat.
	5 00 p. m ..	62.0	65.0	63.4	55.3	.345	.243	E.	1	6	Cum. cir. strat.
	6 00 p. m ..	61.0	64.0	61.0	56.5	.326	.226	S.	1	6	Cum. cir. strat.
	7 00 p. m ..	60.0	63.0	59.0	53.4	.316	.219	N.	1	7	Cum. cir. strat.
	8 00 p. m ..	60.0	63.0	54.0	50.0	.265	.168	N.	1	7	Cum. cir. strat.
Aug. 25	10 30 a. m	59.0	62.0	56.0	54.0	29.348	29.254	.....	0	7	Nim. cum.
	12 00 m	60.0	64.0	62.5	58.0	.346	.249	NE.	1	5	Cir. nim.
	1 00 p. m ..	60.5	64.0	62.3	58.0	.337	.239	.....	0	0	
	3 00 p. m ..	60.0	64.0	60.7	55.5	.335	.238	S.	1	8	Nim. cum. strat. cir.; light rain.
Aug. 26	9 00 a. m ...	58.5	62.0	56.7	56.0	29.349	29.253	.....	0	7	Cum. cir. nim.
	10 30 a. m ...	59.5	63.0	59.5	56.0	.347	.251	S.	1	4	Cir. cum.
	12 00 m	60.5	64.5	62.8	58.2	.345	.247	SW.	1	4	Cir. cum.
	1 00 p. m ...	62.0	67.5	67.3	60.0	.343	.231	SW.	1	4	Cir. cum.
	2 00 p. m	63.0	67.5	65.0	58.5	.336	.231	SW.	1	6	Cir. cum.
	4 00 p. m .	63.5	67.5	66.5	60.0	.330	.224	SW.	1	6	Cir. cum.
	5 00 p. m ..	62.5	66.0	64.3	58.0	.328	.224	.....	0	7	Cir. cum.
Aug. 27	9 00 a. m	55.0	58.0	48.5	47.0	29.447	29.363	NW.	2	7	Nim.
	11 00 a. m ..	56.0	59.0	49.0	47.8	.460	.373	NW.	3	7	Nim.; light rain.
	12 00 m	56.5	60.5	50.0	47.5	.475	.387	NW.	2	7	Cum. nim.
	4 00 p. m ...	60.0	62.0	50.0	48.0	.476	.379	NW.	2	7	Cum. nim.
	7 00 p. m ...	56.0	60.5	46.5	43.5	.493	.406	NW.	3	8	Nim.

Observations of minimum temperature during the night.

[Spirit thermometer, having a steel index within the tube.]

Date.	Observed minimum temperature.	Thermometer reduced to open-air dry thermometer.	Date.	Observed minimum temperature.	Thermometer reduced to open-air dry thermometer
	°	°		°	°
August 19, 1869	41.0	39.6	August 24, 1869	36.2	34.9
August 20, 1869	43.5	42.0	August 25, 1869	46.0	44.4
August 22, 1869	42.4	40.9	August 26, 1869	48.0	46.3
August 23, 1869	42.4	40.9	August 27, 1869	44.5	43.0

Latitude 66° 33′ 47″, longitude 145° 17′ 47″ west of Greenwich; computed by Capt. C. W. Raymond, Engineer Corps, U. S. Army, July to September, 1869.

ABSTRACT OF DAILY JOURNAL KEPT AT UNALASHKA ISLAND, ALASKA.

SEPTEMBER, 1878.

September 2: Gale from the northwest.—September 3: Gale from the west.—September 5: Light gale from E. to SE.; moderate rain.—September 6: Light gale from the southwest; hard rain.—September 7: Misty in a. m.; moderate rain-fall.—September 11: Moderate rain.—September 13: Light rain.—September 14: Light rain.—September 15: Light rain.—September 16: Moderate rain.—September 17: Moderate rain.—September 18: Hard rain.—September 19: Moderate rain.—September 24: Gusty gale; light rain.—September 25: Light rain.—September 28: Light rain; gusty, high winds.—September 29: Light rain; snow on the mountains.—September 30: Moderate rain; gusty, high winds.

OCTOBER, 1878.

October 1: Moderate rain-fall; heavy snow on the hills.—October 2: Light rain.—October 3: Light rain; snow falls every night on the hills.—October 4: Light rain and sleet.—October 5: Light frost during night.—October 6: Hard storm of wind; light rain from the southwest.—October 7: Fearful storm from the southwest; moderate rain.—October 9: Gusty, gale from SW. to SE.; moderate rain.—October 11: Light rain.—October 14: Gusty gale from the southwest.—October 15: Moderate rain, fell as snow on the hills.—October 16: Light snow; heavy squalls of sleet.—October 17: Heavy squalls of sleet.—October 18: Snow squalls.—October 20: Moderate snow fell.—October 22: Moderate rain.—October 23: Moderate gale from the southeast; heavy rain.—October 24: Moderate rain.—October 25: Heavy rain; high, gusty winds from the southeast.—October 26: Very hard rain.—October 29: Light rains; solar halo.—October 30: Moderate rain.—October 31: Light rain; snow has fallen quite heavily on the mountains.

NOVEMBER, 1878.

November 1: Heavy frost; lunar corona; solar halo; heavy snow on the hills.—November 2: Light snow squalls.—November 3: Heavy snow.—November 5: Light snow squalls.—November 6: Moderate rain and snow.—November 7: Light rain.—November 8: Gusty gale from SE. to SW.; light squalls of snow and sleet.—November 9: Strong gusty gale from the west; heavy snow and sleet squalls.—November 10: Gusty gale from the southeast; heavy rain and sleet.—November 12: Slight earthquake reported at 2.30 a. m.—November 14: Moderate snow fell.—November 15: Slight spits of sleet.—November 16: Moderate snow; solar halo.—November 17: Moderate snow.—November 18: Heavy snow.—November 20: Snow squalls.—November 21: Snow falling lightly.—November 22: Heavy snow.—November 23: Light snow.—November 24: Heavy snow.—November 25: Moderate snow.—November 26: Moderate snow.—November 28: Rain, sleet, and snow quite heavy.—November 29: Light rain.

DECEMBER, 1878.

December 1: Light snow.—December 2: Light snow.—December 3: Strong gale from the southeast; snow changing to rain, quite heavy.—December 4: Hard rain.—December 5: Moderate rain.—December 6: Rain, snow, and sleet in heavy squalls.—December 8: Hard rain.—December 11: Moderate rain, sleet, and snow.—December 12: Moderate snow.—December 13: Strong, gusty gale from the southeast; moderate rain.—December 15: Moderate rain.—December 16: Moderate snow.—December 18: Heavy snow.—December 19: Heavy snow squalls.—December 21: Fearful gale from the north; much drifting snow.—December 22: High gale from N. to NW.; falling snow drifted.—December 23: Snow fell and drifted from high winds.—December 24: Misting, later heavy rain.—December 25: Fearful gale from the southeast; dashing rain melted nearly 3 feet of ground-snow.—December 26: Heavy rain.—December 27: High gale from the southeast; very heavy rain.—December 28: Terrific gale increased to storm from the southeast; heavy rain-fall.—December 29: High, gusty gale from SE. to SW.; heavy rain with snow.—December 30: Rain and snow of moderate character.—December 31: Fearful hurricane from SE. to E.; very heavy rain-fall. An aneroid barometer in the office of the Alaska Commercial Company read 27.84 at 4.20 p. m.; all the snow melted from the mountains.

JANUARY, 1879.

January 1: Moderate rain.—January 2: Light rain.—January 3: Light snow.—January 4: Moderate rain and snow.—January 5: Light snow.—January 6: Light snow.—January 10: Light rain.—January 11: Misty.—January 12: Light snow.—January 16: Snow squalls of hard character.—January 17: Snow and sleet, drifted furiously.—January 20: Snow and rain of light character.—January 21: Gale from the southwest; heavy snow.—January 22: Gusty gale from the southwest.—January 24: Heavy rain.—January 25.—Moderate rain.—January 26: Hard gale from the southeast; hard snow squalls; snow drifted.—January 27: Fearful gale; hard snow fall.—Januaray 28: Gusty gale from the southwest; snow squalls.—January 29: Awful hurricane from the southwest; snow fell and drifted furiously; aneroid barometer in the office of the Alaska Commercial Company read 27.70 at 4.20 p. m.—January 30: Terrific gale from the southwest; snow fell and drifted furiously.—January 31: Lunar halo. The natives predicted that this month would be one characterized by its extreme mildness; the report shows that each day was busy and replete with atmospheric disturbances.

FEBRUARY, 1879.

February 1: Heavy rain.—February 2: Moderate snow.—February 5: Gusty gale from the southeast; solar halo from drifting snow.—February 6: Moderate rain.—February 7: Gusty gale from the southeast; moderate rain.—

February 8: Moderate rain.—February 12: Moderate rain.—February 13: Moderate rain.—February 14: Hard frost.—February 19: Gusty gale from NE. to NW.; light snow.—February 20: High gale, very gusty, from N. to NW.—February 21: Gusty gale from N. to NW.; hard snow squalls.—February 22: Snow fell and drifted.—February 23: Snow fell and drifted.—February 24: Snow drifted furiously.—February 26: Snow drifted lightly.—February 27: Snow drifted furiously.—February 28: Light snow fell.

MARCH, 1879.

March 1: Hard snow squalls.—March 3: Much snow drifted.—March 6: Solar halo and parhelia.—March 9: Heavy snow.—March 10: Heavy snow.—March 11: Heavy snow.—March 12: Snow squalls of light character.—March 13: Hard snow-fall.—March 17: Misty.—March 18: Heavy snow fell.—March 23: Solar halo.—March 25 Imperfect solar halo.—March 28: Blinding snow-storm; little rain fell.—March 29: Moderate snow squalls.—March 30: Light snow squalls.—March 31: Warmer, with threatened rain.

APRIL, 1879.

April 1: Arrival of schooner Bella from San Francisco; snow squall of frequent occurrence.—April 2: Snow squalls of moderate character.—April 3: Light snow and sleet.—April 5: Gale from the southwest, very gusty; wet snow fell.—April 6: Moderate snow fell.—April 7: Moderate snow fell.—April 9: Moderate snow fell.—April 10: Heavy snow.—April 11: Gusty gale from the west.—April 12: Light snow.—April 14: Light snow.—April 17: Fearful snow-storm, much drifting.—April 18: Imperfect solar halo.—April 19: Heavy snow fell.—April 20: Light snow.—April 21: Light snow and sleet.—April 22: Pale solar halo.—April 23: Moderate rain.—April 27: Arrival of vessel St. George from San Francisco. I prepare to depart for Attu Island under instructions from office of the Chief Signal Officer. Observations discontinued at this place.

ABSTRACT OF DAILY JOURNAL KEPT AT ATKHA ISLAND, ALASKA.

MAY, 1879.

May 4: Arrived at this place.—May 5: Vessel discharged cargo.—May 6: Departure of vessel; instruments put in temporary position.—May 7: Began taking meteorological observations; light snow fell in early a. m.—May 9: Light squall of sleet and rain.—May 10: Copious rain.—May 11: Light gale from the southeast; heavy rain.—May 12: Moderate rain.—May 13: Sleet squalls of light character.—May 14: Very gusty gale SE. to S.; heavy rain.—May 15: Strong gale; moderate rain.—May 16: Few flakes of snow.—May 17: Moderate rain; gusty wind.—May 18: Light rain.—May 21: Light snow.—May 22: High winds; light snow.—May 23: Gusty gale from NE. to SE.; moderate rain and few snow-flakes fell.—May 24: Moderate rain.—May 25: Light rain.—May 26: Hard gale from northwest; sleet fell at intervals.—May 26: Light snow fell.—May 29: Light rain.—May 30: Gusty SE. to NW. winds; heavy rain.—May 31: Light rain; high temperature (65°).

JUNE, 1879.

June 1: Light rain.—June 2: Very gusty from the northwest; light to moderate rains.—June 3: Gusty gale from the northwest; moderate rain; severe earthquake at 9.30½ a. m.; the shocks were almost without interval, moving from E. to W.; the undulations numbered eight and lasted about six seconds; the clock was stopped by being thrown out of perpendicular.—June 7: Moderate rain.—June 8: Gusty gale from the northwest; hard rain.—June 9: Light gale from the northwest; heavy rain; sleet fell at times.—June 13: Light rain.—June 16: Solar halo at 2 p. m.—June 17: Pale solar halo.—June 21: Dense fog.—June 22: Light rain.—June 23: Light rain.—June 25: Gusty gale from the northwest.—June 27: Arrival of revenue cutter Richard Rush.—June 28: Departure of Richard Rush.—June 30: Gusty gale from the northwest; light rain.

JULY, 1879.

July 1: Heavy rain-fall.—July 2: Light gale from the west; rain, snow, and sleet fell; quite heavily on the hills.—July 3: Solar halo.—July 4: Distant thunder; hard rain.—July 5: Hard rain.—July 8: Heavy rain.—July 11: Hard gale from SE. to SW.; very heavy rain.—July 12: Hard rain.—July 13: Light gale from the southeast; moderate rain.—July 15: Light showers.—July 18: Light gale from the west.—July 23: Moderate rain.—July 24: Moderate rain.—July 28: Moderate rain.—July 29: Heavy rain.—July 31: Very gusty gale from the west.

AUGUST, 1879.

August 2: Drizzling rain.—August 3: Moderate rain; temperature reached 69°.—August 4: Gusty S. to SW. winds; light rain.—August 5: Very heavy rain.—August 6: Very hard rain; lunar corona.—August 7: Moderate rain.—August 8: Gale from the west; light rain.—August 9: Light rain; gusty from the west.—August 11: Hard rain.—August 12: Light rain.—August 14: Hard rain; arrival of schooner St. George, from Unalashka.—August 15: Moderate rain; departure of St. George for the westward.—August 17: Light rain.—August 18: Moderate rain.—August 20: Foggy.—August 21: Hardest dash of rain.—August 22: Very hard rain.—August 23: Very hard rain.—August 27: Gusty in a. m.; hard rain.—August 28: Gusty winds blowing a hard gale from west; moderate rain.—August 29: Arrival of vessel St. George from the westward; depart for Unalashka; observations ceased because there was no one to take them.

MONTHLY ABSTRACT OF DAILY JOURNAL KEPT AT UNALASHKA ISLAND, ALASKA.

After my return from Atkha Island on the 8th of September, I placed the instruments in position and began taking observations on the 17th instant.

SEPTEMBER, 1879.

September 28: Solar halo.—September 29: Light rain.—September 30: Moderate rain.

OCTOBER, 1879.

October 6: Rain, snow, and sleet fell quite heavily.—October 7: Light rain.—October 9: Light rain.—October 10: Moderate rain.—October 11: Light rain.—October 12: Light rain.—October 13: Light rain.—October 14: Moderate rain.—October 15: Light rain.—October 16: Snow fell on the mountains.—October 18: Moderate rain; sleet fel lightly.—October 19: Moderate rain.—October 20: Light rain.—October 21: Gusty gale from the north; snow and sleet squalls; first appearance of fur-seals (*Callorhinus ursinus*) from the breeding-grounds at the Pribilof Islands.—October 22: Gusty gale from the north; snow and sleet squalls of hard character.—October 23: Snow and sleet in light squalls; ice formed on the shallow pools.—October 24: Low gale from the north; hard sleet and snow qualls.—October 25: Moderate rain with sleet squalls.—October 26: Light rain and sleet squalls.—October 27: Gusty gale from the southeast; very heavy rain; arrival of schooner Unalashka from San Francisco.—October 28: Hard gale from the southeast; extremely heavy rain; nearly all the snow has disappeared from the mountains.—October 29: Dashing rain; lunar corona.—October 30: Light rain; frost in the evening.—October 31: Moderate rain, fell as snow on the mountains.

NOVEMBER, 1879.

November 1: Frequent showers of rain; ice formed during the night.—November 2: Heavy snow and rain squalls.—November 3: Rain and snow, the former quite heavy at times.—November 4: Very gusty from SW. to SE.; light rain and snow.—November 5: Very heavy rain.—November 6: Hard rain.—November 7: Light gale from SW. to NW.; moderate rain.—November 8: Gusty gale from the west; snow and rain of light character; departure of Saint George for San Francisco.—November 9: Snow squalls; dense fog in the Unimak Pass.—November 11: Hard gale from SW. to SE.; very heavy rain.—November 12: Strong gale from the southwest; moderate rain.—November 13: Gusty gale from the west; light rain and snow.—November 14: Light rain and snow.—November 15: High gale from the north.—November 17: Rain and hail.—November 18: Rain and snow, very light.—November 20: Light sleet.—November 22: Hard rain.—November 23: Hard rain; very gusty.—November 24: Low gale from the southeast; moderate rain.—November 26: Moderate rain.—November 27: Very heavy rain.—November 28: Lunar corona; departure of Daisy Rowe for San Francisco.—November 29: Drizzling and foggy clouds.—November 30: Light rains.

DECEMBER, 1879.

December 1: Moderate rain.—December 2: Light showers of rain, changed to snow.—December 3: Very gusty winds; frequent squalls of sleet and snow.—December 4: Low, gusty gale from the northwest; snow and sleet squalls, very light.—December 5: Light snow and sleet squalls.—December 6; Light snow and sleet.—December 7: Spits of snow and sleet.—December 9: High gale from the northwest; violent squalls of snow and sleet.—December 10: Gale from the northwest; violent swirls of snow and sleet.—December 17: Hard rain.—December 18: Hard rain.—December 19: Heavy rain.—December 20: Light rain.—December 21: Light rain; schooner Georgie R. Higgins departs for San Francisco.—December 22: Light rains.—December 23: Heavy rains.—December 24: Frost.

JANUARY, 1880.

January 1: Heavy frost.—January 2: General shooting stars this evening.—January 3: Light spit of snow.—January 5; Heavy frost—January 9: Light snow.—January 10: Light now.—January 11: Light snow changing to moderate rain.—January 12: Moderate rain.—January 13: Rain, hail, and snow.—January 16: Very light spit of snow.—January 17: Much rain mixed with snow.—January 18: Hard rain.—January 19: Gusty gale to a low storm rate from the south; light snow fell.—January 20: Gale from the northwest; heavy snow.—January 21: Heavy snow.—January 22: Light snow.—January 23: Light snow; lunar corona.—January 24: Heavy snow.—January 26: Moderate rain; gale from SE. to SW.—January 27: Fine snow fell in late p. m.—January 28: Moderate rain and snow.—January 29: Light snow.—January 30: Light rain and snow; few discharges of hail with rain.—January 31: Gale from the northeast; heavy rain and snow.

FEBRUARY, 1880.

February 1: Moderate rain with snow.—February 2: Light snow.—February 5: Heavy snow and light rain.—February 6: Light rains.—February 8: High winds with snow which drifted furiously.—February 9: Gusty gale from SE. to SW.; rain, snow, and sleet fell in moderate quantities.—February 10: Furious gale from the west; violent drifting of the falling sleet and snow.—February 11: Drifting snow; moderate snow fell.—February 12: Rain and snow

of moderate character.—February 13: Light snow.—February 14: Faint halo and parhelia.—February 17: Fine solar halo, brilliant parhelia, and well-developed lunar halo.—February 18: Hard rain for few minutes, later very light.—February 19: Rain, hail, sleet, and snow of moderate character; arrival of Daisy Rowe from San Francisco.—February 20: Northwest gale of light character.—February 21: Gusty northwest gale.—February 22: Gale from the northwest; moderate rain with snow.— February 23: Moderate rain.—February 24: Light rain.—February 25: Low storm from the southeast; hard rain, little sleet.—February 26: Gusty gale from the northwest, snow and sleet.—February 27: Hard rain with snow.—February 28: Snow and sleet squalls.—February 29: Solar halo and parhelia.

MARCH, 1880.

March 1: Pale halo around the sun.—March 2: Pale solar halo.—March 3: Gusty gale from the west; light rains.—March 4: Light rain.—March 5: Gale from the west; rain, snow, and sleet, with thunder and lightning.—March 6: Gusty gale; rain, snow, and sleet.—March 7: Light rain.—March 8: Light snow.—March 9: Moderate snow.—March 10: Hard rain and snow.—March 11: Light snow.—March 12: Light rain.—March 13: Light gale from the southeast; very heavy rain.—March 14: Light rain.—March 15: Hard storm from the southeast; heavy rain.—March 16: Light rain; pale solar halo.—March 17: Hard rain and snow.—March 18: Light rain.—March 19: High gale from the north; much snow and sleet fell and drifted.—March 20: Gusty gale from the northwest; sleet and snow, drifted as it fell.—March 21: Light rain and snow.—March 24: Light rain.—March 25: Arrival of Mathew Turner from San Francisco.—March 26: Solar and lunar halo.—March 28: Light rain.—March 29: Light rain.—March 30: Very light rain.—March 31: Light showers of rain.

APRIL, 1880.

April 2: Rain and snow of lightest character.—April 3: Light rain and snow.—April 4: Light snow.—April 5: Sleet squalls.—April 6: Light rain and snow.—April 7: Gusty winds from SE. to NW.; moderate rain.—April 8: Strong storm from the north; little snow and sleet; arrival of Unalashka from San Francisco.—April 10: Light gale from the southeast; rain with hail.—April 11: Light snow.—April 12: Light rain, hail, and snow.—April 13: Rain, snow, and sleet.—April 14: High gale from the west; light snow and sleet.—April 15: Large flakes of snow fell lightly.—April 16: Gusty gale from the southwest; moderate rain with snow.—April 17: Gusty gale from southwest; rain, snow, and sleet of lightest character.—April 18: High storm from NW. to N.; moderate snow and sleet; hard freeze last night.—April 19: Heavy snow squall.—April 21: Moderate gale from the northwest; violent sleet squall.—April 23: Light rain; solar halo.—April 24: Light rain.—April 27: Light rain.—April 28: Very light rain.—April 30: Spring-like weather.

MAY, 1880.

May 1: Removal of my office to room adjoining office of the Western Fur and Trading Company.—May 10: Sola halo.—May 12: Hard rain.—May 13: Hard rain.—May 14: Misty.—May 15: High winds; hard rain.—May 16: High winds from the northwest; hard rain; later misty.—May 17: Hard rain.—May 18: Strong gale; hard rain.—May 19: Light rain.—May 21: Light snow and rain.—May 22: Snow and rain of moderate character.—May 23: Misty.—May 26: Heavy frost; solar halo.—May 27: Showery, of light character.—May 29: Preparations for departure to Attu Island, Alaska, for the purpose of taking a series of meteorological observations at that place.

ABSTRACT OF DAILY JOURNAL KEPT AT ATTU ISLAND, ALASKA.

JULY, 1880.

July 21: Placed instrument in position.—July 22: Began taking meteorological observations; fine weather, with clear, warm days and no precipitation for the remainder of the month.

AUGUST, 1880.

August 4: Gusty gale from the northwest; moderate rain.—August 5: Hard gale from the northwest with violent rain.—August 6; Low gale from the northwest; very hard rain.—August 7: Very hard rain with low gale from the northwest.—August 8: Light rain; natives assert that the gale which prevailed for the three past days is an unusual occurrence for August.—August 14: Misty.—August 15: Light, misty rain.—August 16: Light rain.—August 22: Light rain.—August 23: Light rain.—August 26: Hard rain.—August 27: Light rain.—August 28: Misty.—August 29: Hard rain.—August 30: Moderate rain.—August 31: Light rain.

SEPTEMBER, 1880.

September 1: Light rain.—September 6: Very light rain.—September 7: Drizzly.—September 10: Light rain.—September 16: Hard rain.—September 18: Hard rain.—September 20: Frost; lunar halo.—September 21: Showery; lunar halo.—September 22: Light rain.—September 23: Moderate rain.—September 24: Dashing rain; gusty gale from S. to SE.—September 25: Stiff gale from the southeast; hard rain.—September 28: Little hail fell in p. m.—September 30: Dashing rain with gusty gale from the southeast.

OCTOBER, 1880.

October 1: Very hard rain; gale from the north.—October 2: Showers of rain; spits of snow; high winds.—October 3: Hard dashes of rain.—October 4: Snow fell heavily on the mountains.—October 5: A furious gale with gusts of a hurricane rate all day; the roof of my house was taken off, the boards loosened, a flood of water entered from the torrents of rain; the anemometer carried off and bent out of shape; all of my specimens of natural history, including a complete series of plants from various islands of the Aleutian chain, were ruined; no help of any kind here and very little with which to repair damage; all records written with ink were in most instances hopelessly ruined; the wind blew from SE. to E. over the mountain tops in the most violent gusts.—October 6: Gale from the southeast; showery.—October 7: Gusty gale from E. to NE.; hard rain.—October 8: Gusty gale from the northeast; snow on the hills; moderate showers.—October 9: Rain; snow fell in light amounts, disappearing on the hills.—October 10: Lunar halo.—October 11: Moderate rain; heavy snow on the hills.—October 12: Moderate snow and rain.—October 13: Hard rain.—October 16: Light rain.—October 17: Arrival of steamer Dora from eastward; I have, just this day, repaired the damages which occurred to my house on October 5; lunar halo in evening.—October 18: Light rain and snow.—October 20: Moderate rain; light frost.—October 22: Hard rain.—October 23: Light rain.—October 24: Misty.—October 25: Drizzly.—October 28: Moderate frost and freeze.—October 31: Four vibrations of an earthquake at .09 a. m.; undulations from E. to W.

NOVEMBER, 1880.

November 2: Light snow.—November 3: Light sleet and snow spits.—November 7: Rain and hail of light character.—November 8: Light rain; lunar corona.—November 13: Light rain and snow.—November 14: Rain and snow of moderate character.—November 16: Hard gale from the south; moderate rain with snow.—November 17: Moderate rain with little snow.—November 18: Hard rain.—November 19: Hard rain.—November 20: Light to misty rain.—November 22: Misty to moderate rain.—November 23: Hard rain.—November 24: Very hard rain.—November 25: Moderate to hard rain.—November 26: Very hard rain.—November 27: Light rain.—November 28: Very hard rain.—November 29: Furious gale from the southeast; dashing rain.—November 30: Strong gale from the southeast; hard rain with snow.

DECEMBER, 1880.

December 1: Light rain, snow, and sleet.—December 3: Very heavy rain.—December 4: Very heavy rain.—December 5: Light rain.—December 6: Very heavy rain-fall.—December 7: Hard rain.— December 8: Hard rain.—December 9: Light rain.—December 10: Misty; snow on the mountains.—December 11: Very gusty gale from E. to S.; moderate rain with sleet squalls.—December 12: Light sleet, snow and rain.—December 13: Wet snow fell lightly.—December 14: Light sleet; gust from the northeast.—December 15: Sleet squalls; very heavy sea running.—December 16: Sleet of light character, very moist.—December 17: Light rain.—December 18: Hard storm from the northeast; violent sea; hard rain with snow.—December 19: Violent storm from the northeast; heavy rain with snow.—December 20: Gusty north wind; moderate snow with rain.—December 21: Gusty northwest wind.—December 22: High winds backing and subsiding; light sleet squalls; sea violent.—December 23: Gale from the northwest; light sleet squalls.—December 24: High gale from the northwest; sleet and snow.—December 25: High gusty gale from the west and northwest; sleet swirls of light character.—December 26: High gale from W. to NW.; little snow fell; sea raging violently.—December 27: High gale from the northwest.—December 28: Northwest gale of gusty character; rain, sleet, hail, and snow fell of lightest character.—December 29: Northwest gale, rather gusty; hard rain and snow.—December 30: Heavy rain; snow nearly gone; sea going down.—December 31: Hard rain; natives report an earthquake shock as having occurred at or about 2 a. m. of night before last (30th); a slight shock was felt at 7.25 p. m.

JANUARY, 1881.

January 1: Moderate rain and snow.—January 2: Light snow.—January 3: Air full of frost films.—January 5: Terrific gusts of a high storm rate from SW. to SE.; snow drifted furiously from the mountain tops.—January 6: Very heavy fall of frost films from the sky during clear weather; not a cloud in the sky when they fell, yet the air was darkened with the films.—January 7: Gusty south winds; snow drifted furiously; sleet later in the day, with heavy gusts of wind.—January 8: Frightful gusts of a high storm rate from S. to SE.; heavy dashes of rain.—January 9: Gusty gale from S. to SE.; solar halo; moderate snow.—January 10: High gale from S. to SW.; frequent hard snow squalls.—January 11: Light frequent fluffs of snow.—January 12: Gusty gale from SW. to SE.; moderate sleet and snow.—January 13: Gusty S. to E. winds; moderate snow and rain.—January 14: Rain, icy sleet, hail fell of hard character.—January 15: Heavy snow; light gusty gale from E. to NE.; light snow and sleet.—January 16: Violent snow and sleet squalls; sea violent; rain fell late in p. m.—January 17: Gale, very gusty from the north; sleet and snow squalls; lunar corona.—January 18: Gustiness from N. to NW.; fierce snow and sleet squalls; slush forms in the bay.—January 19: Few sleet pellets.—January 20: Temperature 17°, lowest up to date; very gusty from the northwest, increased to a hard gale; frequent sleet and snow squalls; snow flying furiously.—January 21: Heavy fall of sleet and snow; the ground is covered to a depth of 5 feet with sleet and snow.—January 22: Gale from the northwest, increased to storm; snow and sleet fell heavily; snow drifted furiously.—January 23: Rain and snow; the bay is covered with frozen snow-slush, a very unusual occurrence; water-fowl are extremely scarce.—January 24:

Moderate rain and snow; gusty gale from the north.—January 25: Gusty gale from the north; light rain.—January 26: Light gale late in p. m. from the south; rain and snow fell lightly.—January 27: Hard rain with little snow; hard gale rate from SE. to E.—January 28: Gusty gale from the northeast; moderate rain with snow.—January 29: Gusty gale from S. to NE.; hard rain with snow.—January 30: Heavy sea running.—January 31: Natives preparing to go off to the other islands to hunt sea-otters; they are detained by the severe weather of this entire month; late in p. m. they started, but were soon compelled to go to land; the snow has nearly disappeared from the low grounds; all kinds of water-fowl are extremely scarce, and fresh food is not attainable.

FEBRUARY, 1881.

February 1: Light snow and sleet.—February 2: Deposit of frost on various objects; hard freeze; snow of light character in p. m.—February 3: Heavy sea running.—February 6: Light snow with drizzling rain.—February 7: Gusty gale from the south; short, hard rain; snow drifted violently; lunar corona.—February 8.—Violent gusts from the south; quite hard freeze.—February 9: Hard gale, increased to a storm rate from the northeast; hard rain with snow.—February 10: Light rain, with snow and sleet squalls; lunar corona.—February 11: Sea very rough.—February 12: Lunar corona.—February 13: South to east gale; light rain-fall.—February 14: High gale from NE. to NW.; grass beginning to peep out.—February 15: Moderate snow with gale from the north.—February 16: Gusty gale from the northwest; fine snow fell.—February 17: Light skifts of snow and sleet.—February 19: Light snow-fall.—February 20: Great gustiness of wind from the north; misty.—February 21: Hard rain; earthquake at 7.16 p. m.; it gave quite a wrench to the house; undulations from E. to W.—February 22: Light gale from NE. to N.; moderate rain; violent sea running.—February 24: Light snow fell.—February 25: High gusty winds from SW. to NW.—February 26: Sleet and snow squalls.—Febrnary 27: Gale from S. to SW.; light sleet and snow fall.—February 28: Violent snow squalls, with sleet; during this month the natives have made several ineffectual attempts to cross the straits between this island and the Semechi Islands, to hunt sea-otters (*Enhydris lutris*) at the latter place; the weather has not been so bad during the month of February for several years.

MARCH, 1881.

March 1: Gusty gale from the south; light snow-fall.—March 2: Heavy snow-fall.—March 3: Solar halo.—March 4: Moderate snow-fall.—March 6: Gusty gale from the south; increased to high storm from northeast; snow drifted most furiously, a gloomy day; the very earth trembles under the shocks received from the force of the surf of the violently raging sea.—March 7: Violent gusts from SW. to SE; snow fell and drifted furiously.—March 8: Very gusty from SW. to SE.; snow fell heavily and drifted.—March 9: Sleet and snow drifted violently.—March 10: Gusty gale from the south; sleet and snow drifted furiously.—March 11: Light sleet and snow squalls.—March 12: Lowest temperature (10°).—March 13: High gale from E. to NW.; light snow-fall.—March 14: Heavy gale outside from the northwest; snow and sleet fell lightly.—March 15: Hard storm from the north; moderate snow with little sleet.—March 16: Gusty gale from S. to SE.; snow fell late.—March 17: Violent gale from SW. to E.; snow of moderate character fell, much drifted; sea in terrible commotion.—March 18: Strong gale from N. to NE.; little snow fell.—March 19: Hard storm from N. to NE.; violent sea; sleet and snow squalls.—March 20: Gale from the northeast; light snow.—March 21: Light snow skifts.—March 22: Hard gusts from NW. to S. and NE.; sleet and snow of moderate character.—March 23: Severe earthquake at 7.04 p. m.; began as gradual settling then a series of rapidly successive vibrations lasting nineteen seconds.—March 24: Terrific gale from the southeast; snow and sleet furiously drifted.—March 25: Light sleet and snow with great gustiness of wind from S. to SE.—March 26: Large flakes of snow; light mist.—March 27: Gusty from N. to NE.; misty.—March 28: Violent sea running; light rain.—March 29: A light freeze and frost; light rain.—March 31: Light snow changed to rain.

APRIL, 1881.

April 1: Violent hurricane from SW. to SE.; dashing rain; all the snow gone from the lower grounds; arrival of wild geese (*Branta canadensis hutchinsii*); several snow-flakes (*Plectrophenax nivalis*) were seen to-day; they are not migratory from this island; the greater number of these birds remain throughout the winter but are only rarely seen during that time on the north side of the island.—April 2: Irregular gale from SW. to S.; rain, snow, and sleet fell moderately; a severe earthquake of sufficient force to awaken the entire village occurred at 3.15 a. m.; several vibrations, all from E. to W.—April 3: Moderate snow and sleet; the party of hunters (19) return from the Semechi Islands; they had but poorest success, having obtained but six sea-otter skins where in former years they secured over a hundred.—April 4; Gusty gale from N. to S. *via* E.; sleet and snow fell lightly.—April 5: Hard gale from S. to SE.; light snow with rain.—April 6: Gusty gale from the east.—April 8: Gusty gale from the south.—April 9: Low gale from the north; misty in p. m.—April 10: Moderate rain; I learn to-day, that swans (*Olor columbianus*) were in a large flock in the lake near the head of Massacre Bay on the south side of this island.—April 11: N. to E. gale; high sea; moderate rain.—April 12: High gale from the northeast; light rain with little sleet.—April 13: Northeast gusty gale; very high sea running.—April 15: Light rain with snow.—April 16: Hard rain with snow; variable gale from the northeast.—April 17: Low gale from the north; hard rain with snow.—April 18: Light rain; gale from the north.—April 19: Heavy snow-fall.—April 20: Moderate snow-fall.—April 23: Strong gale from the south.—April 24: Solar halo.—April 25: Light rain.—April 26: Light snow-fall with rain.—April 27: Light rain-fall. April 30: Light rain.

MAY, 1881.

May 5: Gusty from S.; light rain.—May 6: Frequent showers; frost in late p. m.—May 7: Terrific gusts from S. to SE.; frost of light character; much wet snow falling at times.—May 8: Hard showers; gusty gale from S. to NW.—May 9: Wind everywhere, blowing a gale at times; rain and snow fell lightly.—May 10: Light snow.—May 11: Frequent rains and snow; arrival of steamer Dora from eastward.—May 12: Rain and wet snow nearly entire day; departure of Dora; schooner Czar arrived off the island at 7.40 p. m; preparations to leave this place.—May 13: Czar came to anchor; heard that word had been sent that I was to be relieved of duty; preparation for departure to Unalashka where I arrived June 28. Turned over all Government property in my possession to S. Applegate, Sergeant, Signal Corps, U. S. Army, on July 2, 1881; leave for San Francisco on July 22, 1881; arrive in Washington September 16, 1881.

Summary of meteorological observations taken at places on the Aleutian Islands, Alaska.

[Unalashka Island (Iliuliuk Village). Latitude 53° 53′; longitude 166° 33′.]

Months.	Mean barometer.	Maximum barometer.	Minimum barometer.	Mean temperature.	Maximum temperature.	Minimum temperature.	Amount of rain and melted snow.	Number of days on which rain or snow fell.	Clear days.	Fair days.	Cloudy days.	N. (times from).	NE. (times from).	E. (times from).	SE. (times from).	S. (times from).	SW. (times from).	W. (times from).	NW. (times from).	Calm.	Miles of wind for the month.
1878–'79.																					
September	.....	.....	.....	48.02	55	36	2.55	16	0	0	30	3	0	10	54	36	57	19	23	7	.....
October	.....	.....	.....	40.77	49	26	3.97	20	0	0	31	7	0	0	66	17	77	17	19	20	.....
November	.....	.....	.....	33.50	48	21	3.78	19	1	2	27	0	13	37	5	47	14	36	6	52	.....
December	.....	.....	.....	35.12	45	19	10.02	24	2	0	29	9	0	6	97	3	22	9	37	24	.....
January	.....	.....	.....	33.97	48	20	2.88	21	1	0	30	4	3	1	49	46	71	14	2	27	.....
February	.....	.....	.....	29.25	44	7	1.35	16	1	2	25	34	9	1	59	22	3	9	39	21	.....
March	.....	.....	.....	32.16	49	15	3.26	10	8	7	16	4	3	4	48	7	21	8	14	109	.....
April	.....	.....	.....	33.07	52	21	2.93	19	0	1	27	1	8	0	27	19	49	25	39	28	.....

[Nazan Bay, Atkha Island. Latitude 52° 10′ 40″; longitude 174° 15′ 18″ W.]

1879.																					
May*	.....	.....	.....	39.90	65	30	4.49	16	0	0	25	1	4	7	65	9	13	22	28	16	.....
June†	.....	.....	.....	42.06	64	30	1.76	11	0	2	28	8	2	27	47	0	15	41	41	29	.....
July	.....	.....	.....	48.96	65	38	4.25	16	2	4	25	0	9	7	40	16	18	58	5	64	.....
August‡	.....	.....	.....	50.31	69	45	8.01	20	0	0	29	1	2	0	40	5	43	74	2	34	.....

[Unalashka Island, Iliuliuk Village.]

1879–'80.																					
September§	.....	.....	.....	41.85	51	37	0.37	2	0	0	14	10	10	0	29	5	22	8	0	14	1,496
October	.....	.....	.....	37.93	48	24	6.98	23	0	0	31	45	18	4	20	3	22	53	38	13	8,111
November	.....	.....	.....	31.26	36	24	6.56	23	0	0	31	9	9	0	39	7	53	54	12	27	7,568
December	.....	.....	.....	30.32	34	23	2.68	15	1	4	26	2	14	0	42	4	20	7	111	17	8,799
January	.....	.....	.....	29.23	35	19	4.11	20	1	0	30	29	5	32	47	16	35	23	15	15	7,213
February	.....	.....	.....	31.37	43	27	3.30	19	0	1	28	11	9	6	44	18	33	50	22	11	9,611
March	.....	.....	.....	33.25	46	24	3.28	25	1	1	29	12	21	1	61	9	7	63	4	39	7,751
April	.....	.....	.....	32.82	52	25	1.18	19	0	4	27	21	4	7	65	10	11	39	18	32	8,963
May‡	.....	.....	.....	35.10	52	28	2.80	10	0	0	29	14	38	0	41	2	3	14	63	25	6,980

[Chichagof Harbor, Attu Island. Latitude 52° 55′ 42″; longitude 186° 47′.]

1880–'81.																					
July‖	29.794	30.152	29.497	52.35	66	42	0	0	5	3	2	3	0	0	0	0	0	30	27	10	924
August	29.659	30.113	29.096	51.56	66	38	4.62	16	3	5	23	40	6	5	3	13	0	33	40	27	5,184
September	29.887	30.222	29.179	47.75	58	36	4.06	14	6	6	18	24	12	1	26	50	13	18	18	49	6,408
October	29.987	30.466	28.922	41.12	49	30	8.91	17	0	4	27	65	49	5	14	23	21	20	3	12	4,773
November	29.526	30.188	28.771	35.45	46	25	6.46	20	0	4	26	74	13	9	15	51	12	2	15	18	7,784
December	29.520	30.344	28.754	33.91	44	22	6.52	23	0	1	30	36	47	9	41	19	0	0	60	5	14,474
January	29.375	30.311	28.748	31.17	42	17	5.19	26	1	6	24	27	27	8	23	32	7	4	18	21	9,933
February	29.638	30.343	28.926	31.95	41	17	2.91	17	0	8	20	31	25	6	15	76	8	0	20	15	7,781
March	29.598	30.134	28.639	29.02	41	11	2.43	23	1	7	23	49	29	5	21	46	7	1	24	35	10,558
April¶	29.787	30.703	28.820	36.70	52	26	2.16	14	0	3	27	35	49	16	17	53	8	0	12	20	10,922
May	.....	.....	.....	39.55	49	31	1.20	7	0	1	12	6	3	1	18	37	11	7	1	4	3,597

* First twenty-eight days of the month.
† Last twenty-five days of the month.
‡ First twenty-nine days of the month.
§ Last fourteen days of the month.
‖ Last ten days of the month.
¶ First thirteen days of the month.

Meteorological observations at Iliuliuk, Unalashka, 1825 to 1834, old style.

[Latitude 53° 52′.7; longitude 166° 29′.1. Observations of the barometer, reduced to 14° Reaumur 63°.5 Fahrenheit.]

Years.	January.			February.			March.			April.		
	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.
1825	30.09	28.45	29.041	29.51	28.42	28.983	29.71	28.19	28.958	29.88	29.84	29.342
1826	29.59	28.58	29.030	30.19	29.49	29.588	29.94	28.49	29.243	30.02	28.56	29.219
1827	30.04	28.49	29.218	29.97	28.49	29.297	30.01	28.77	29.320	30.04	28.70	29.414
1828	29.94	28.77	29.47	29.84	28.35	29.17	30.08	28.72	29.42	29.74	28.96	29.32
1829	29.73	28.36	29.29	28.69	28.55	29.20	29.98	28.51	29.08	29.24	28.44	29.55
1830	29.96	28.97	29.455	30.38	28.87	29.592	30.12	28.93	29.639	30.20	28.75	29.360
1831	30.14	28.26	29.307	30.05	28.27	29.107	30.00	28.15	29.309	30.08	28.66	29.501
1832	30.22	29.03	29.743	30.25	29.07	29.697	30.11	29.28	29.778	29.97	28.98	29.533
1833	29.59	28.40	29.030	30.08	28.67	29.246	30.06	28.50	29.302	30.11	28.60	29.573
1834	30.26	28.90	29.579	30.39	28.49	29.599	30.26	29.17	29.860	29.99	28.79	29.429
Means	29.96	28.90	29.317	30.03	28.66	29.341	30.03	28.57	29.416	30.02	28.73	29.429
Highest and lowest	30.26	28.26	.....	30.39	28.27	.....	30.26	28.15	.....	30.24	28.44	.....

Years.	May.			June.			July.			August.		
	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.
1825	29.90	28.95	29.419	29.79	28.88	29.364	29.81	28.98	29.501	29.86	28.75	29.400
1826	29.92	29.02	29.498	29.89	29.04	29.491	29.78	28.09	29.447	29.85	29.21	29.551
1827	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1828	30.06	28.94	29.50	29.78	28.96	29.44	29.82	29.18	29.56	30.00	29.20	29.65
1829	30.11	28.80	29.43	29.89	29.05	29.55	29.78	29.99	29.578	30.22	29.09	29.518
1830	30.01	28.92	29.505	29.86	28.87	29.542	30.03	29.04	29.653	29.87	28.95	29.457
1831	29.90	28.90	29.559	30.10	29.13	29.642	30.04	29.13	29.571	29.93	29.02	29.493
1832	29.85	29.04	29.500	29.89	29.23	29.604	30.05	29.05	29.685	29.95	29.00	29.511
1833	29.80	29.17	29.518	.....	.....	.....	30.00	29.16	29.712	30.04	29.11	29.611
1834	30.00	29.44	29.713	29.99	29.07	29.528	.....	.....	.....	.....	.....	.....
Means	29.95	29.02	29.464	29.89	29.04	29.520	29.91	29.09	29.588	29.97	29.04	29.537
Highest and lowest	30.11	28.80	.....	30.10	28.87	.....	30.05	28.98	.....	30.22	28.75	.....

Years.	September.			October.			November.			December.			Yearly means.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Mean.	Min.	
1825	29.84	28.74	29.400	29.87	28.17	29.202	29.76	28.31	29.065	.....	.....	.....	*29.299
1826	29.64	28.41	29.100	29.79	28.15	29.105	29.70	28.07	28.991	30.14	28.56	29.553	29.318
1827	.....	.....	.....	29.85	29.01	29.23	30.08	28.60	29.44	30.26	28.87	29.65	†29.373
1828	29.77	28.74	29.41	29.62	28.45	29.16	29.85	28.66	29.20	30.38	28.71	29.83	29.43
1829	29.79	28.50	29.161	30.05	28.87	29.521	30.31	28.57	29.669	30.23	28.88	29.709	29.438
1830	30.15	28.54	29.402	30.05	28.94	29.512	29.93	28.05	29.076	29.92	28.07	29.328	29.460
1831	30.06	28.95	29.176	30.04	28.59	29.586	29.91	28.21	29.542	29.55	28.11	28.892	29.397
1832	29.89	28.90	29.538	30.01	28.45	29.536	29.82	28.46	29.214	30.32	28.64	29.428	29.572
1833	29.82	28.49	29.259	29.65	28.51	29.019	29.63	28.65	29.388	30.22	28.07	29.392	29.368
1834	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	‡29.629
Means	29.87	28.66	29.307	29.90	28.57	29.319	29.88	28.39	29.287	30.13	28.57	29.475	.....
Highest and lowest	30.15	28.41	.....	30.05	28.15	.....	30.31	28.05	.....	30.38	28.07	.....	.....

*Mean for eleven months. †Mean for seven months. ‡Mean for six months.

NOTE.—The barometer by which the above observations were made is marked Benjamin 94 XV, and was compared in 1827 with the barometer of the discovery vessel Seniavin under ———, and found to read 0.32 inch lower; therefore all these observations must be increased by that amount.

The mean of all the above observations, nine full years, is 29.421 inches, the highest observed reading in the above time was 30.39 inches and the lowest 28.05 inches.

Meteorological observations at Ikuliuk, Unalaska, 1827–1834.

[Temperature observations from 1828 to 1834, old style.]

Year.	January.						February.						March.					
	A. M.	Noon.	P. M.	Mean.	Observed.		A. M.	Noon.	P. M.	Mean.	Observed.		A. M.	Noon.	P. M.	Mean.	Observed.	
					Max.	Min.					Max.	Min.					Max.	Min.
1828	.....	.....	.....	40.8	.....	.....	.....	.....	.....	32.8	.....	.....	.....	.....	.....	31.8	.....	.....
1829	.....	.....	.....	28.6	.....	.....	.....	.....	.....	31.1	.....	.....	.....	.....	.....	32.3	.....	.....
1830	20.5	23.8	19.8	21.30	39.9	2.7	26.1	33.0	26.1	28.4	44.4	—0.6	17.1	24.8	17.9	19.9	45.5	0.5
1831	28.2	30.5	28.1	28.93	41.0	9.5	26.8	29.4	25.1	27.41	47.7	10.2	26.8	30.9	24.5	27.43	42.6	7.2
1832	25.2	30.3	24.3	26.60	41.0	7.2	34.0	36.9	33.2	34.77	48.9	25.2	33.9	37.8	32.3	34.65	63.5	18.5
1833	29.8	33.2	29.6	30.86	40.3	18.5	32.6	35.8	32.2	33.49	42.1	18.5	30.2	36.9	28.9	32.00	58.4	19.6
1834	29.6	32.3	30.1	30.31	39.4	16.2	31.8	36.6	30.9	33.10	45.5	20.7	29.7	36.4	28.4	31.53	48.4	15.1
Means	26.66	30.02	25.98	29.56	40.32	10.82	30.18	34.34	29.7	31.58	45.72	14.8	27.54	33.36	26.4	29.93	51.66	12.18

Year.	April.						May.						June.					
	A. M.	Noon.	P. M.	Mean.	Observed.		A. M.	Noon.	P. M.	Mean.	Observed.		A. M.	Noon.	P. M.	Mean.	Observed.	
					Max.	Min.					Max.	Min.					Max.	Min.
1828	.....	.....	.....	36.7	.....	.....	.....	.....	.....	41.2	.....	.....	.....	.....	.....	46.8	.....	.....
1829	.....	.....	.....	33.8	.....	.....	.....	.....	.....	41.2	.....	.....	.....	.....	.....	46.8	.....	.....
1830	36.9	40.8	34.8	37.5	50.7	29.7	39.5	42.6	37.3	40.0	55.6	32.7	45.7	46.3	42.3	44.8	56.7	40.3
1831	31.7	38.2	29.8	33.21	46.2	16.2	37.2	41.0	35.6	37.94	52.2	27.5	45.0	48.1	42.0	45.02	57.9	34.2
1832	36.3	39.3	34.4	36.66	47.7	25.9	45.3	45.1	38.6	42.59	61.2	32.7	47.2	50.4	45.4	47.64	64.9	42.1
1833	36.8	39.3	34.4	36.81	47.7	18.5	43.2	45.2	40.6	43.0	61.2	36.5	45.7	48.2	43.2	46.21	66.9	43.2
1834	34.2	38.3	33.5	35.33	58.4	26.4	40.6	49.3	39.0	43.0	58.3	31.3	.....	.....	.....	.....	.....	.....
Means	35.18	39.18	33.38	35.72	49.14	23.34	41.16	44.72	38.22	41.28	57.70	32.14	45.90	48.25	43.32	46.21	62.1	39.95

Year.	July.						August.						September.					
	A. M.	Noon.	P. M.	Mean.	Observed.		A. M.	Noon.	P. M.	Mean.	Observed.		A. M.	Noon.	P. M.	Mean.	Observed.	
					Max.	Min.					Max.	Min.					Max.	Min.
1827	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1828	.....	.....	.....	50.9	.....	.....	.....	.....	.....	56.7	.....	.....	.....	.....	.....	45.9	.....	.....
1829	49.5	53.8	47.5	50.3	67.8	43.2	47.6	51.7	46.4	48.5	64.6	38.3	45.3	48.5	43.8	45.7	56.9	39.9
1830	50.4	55.3	47.0	50.4	71.4	42.1	53.9	56.9	50.3	53.7	77.0	43.9	42.5	46.1	42.3	43.3	50.0	28.6
1831	46.6	48.2	43.8	46.19	64.6	39.4	46.6	51.3	44.4	47.45	61.2	40.3	39.9	43.1	37.9	40.32	52.2	32.0
1832	51.4	54.5	49.0	51.66	70.2	43.2	53.6	58.4	52.5	54.90	77.0	42.1	40.1	45.5	40.1	41.90	50.0	25.9
1833	53.9	57.5	51.1	54.17	76.3	44.8	49.8	53.8	47.0	50.20	78.6	38.1	43.2	47.9	43.4	44.87	54.5	32.0
1834	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Means	50.36	53.46	47.68	50.60	70.06	42.54	50.3	54.42	48.12	51.91	70.68	40.54	42.22	46.22	41.40	43.66	54.48	29.88

Year.	October.						November.						December.						Yearly means.
	A. M.	Noon.	P. M.	Mean.	Observed.		A. M.	Noon.	P. M.	Mean.	Observed.		A. M.	Noon.	P. M.	Mean.	Observed.		
					Max.	Min.					Max.	Min.					Max.	Min.	
1827	.....	.....	.....	35.8	.....	.....	.....	.....	.....	36.5	.....	.....	.....	.....	.....	35.4	.....	.....	.....
1828	.....	.....	.....	38.5	.....	.....	.....	.....	.....	31.8	.....	.....	.....	.....	.....	25.0	.....	.....	38.05
1829	37.6	40.5	37.0	38.3	54.5	26.8	33.2	36.5	32.8	34.2	54.5	18.5	29.0	31.5	27.9	29.40	46.6	12.0	36.41
1830	35.9	38.3	36.0	36.7	46.6	24.6	28.7	31.9	28.6	29.7	43.9	14.7	24.8	27.1	23.7	25.20	42.1	7.9	35.51
1831	35.1	38.7	34.4	36.05	45.5	23.0	32.0	34.6	31.8	32.76	39.9	19.6	29.9	32.8	29.3	30.65	39.9	12.9	35.46
1832	34.1	37.6	35.1	35.60	46.9	24.1	33.5	35.2	33.7	34.13	47.7	26.4	29.3	31.3	30.1	30.26	45.5	18.5	38.52
1833	34.7	39.2	34.3	36.07	48.9	20.8	26.3	31.4	26.3	27.99	37.2	6.1	26.7	29.0	26.1	27.30	38.7	5.0	37.73
1834	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Means	35.48	38.86	35.36	36.72	48.88	23.86	30.74	33.92	30.64	32.44	44.64	17.06	27.94	30.34	27.42	29.03	42.56	11.8	37.26

Observations for direction of wind at Iliuliuk, Unalashka, for 1825, 1826, 1827,* 1828, 1829,† 1830, 1831, 1832, 1833, 1834, *old style.*

Months.	Direction.								
	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Calms and high airs.
January	120	22	52	74	88	29	49	60	138
February	58	20	81	66	74	45	48	62	148
March	81	16	48	83	84	66	83	96	81
April	53	32	63	81	81	87	79	67	90
May	40	42	78	76	68	63	87	81	113
June	34	38	56	84	89	77	41	47	130
July	21	23	17	72	94	130	73	22	141
August	37	16	15	74	76	85	101	54	176
September	67	19	25	58	55	82	114	63	149
October	52	13	29	54	55	94	92	107	156
November	68	18	37	57	57	69	122	73	133
December	139	20	47	39	50	52	55	114	134
Separate observations in 1827, 1828, and 1829	196	113	219	242	256	143	144	154	642
Total	966	401	767	1,060	1,127	1,022	1,089	1,002	2,231

* January, February, March, April, October, November, December. † First six months. In this time about 160 observations lost.

Observations for the force of wind at Iliuliuk, Unalashka, for seven years, between 1825 *and* 1834, *old style.*

Months.	Force.				
	Light.	Moderate.	Fresh.	Strong.	Very strong.
January	226	137	59	41	12
February	227	114	63	36	8
March	255	167	80	46	7
April	250	167	95	83	5
May	272	187	66	21	0
June	330	112	43	9	1
July	279	104	53	13	0
August	265	145	48	9	1
September	206	131	85	46	2
October	209	139	79	46	8
November	224	115	77	54	4
December	217	116	82	73	8
Total	2,980	1,634	830	427	66

Three observations each day.
NOTE.—On the 17th of March and 29th of October, 1833, the wind was extraordinarily strong.

Observations of the weather at Iliuliuk, Unalashka, for seven years, 1825, 1826, 1829,* 1830, 1831, 1832, 1833, 1834*, *old style.*

Months.	Without clouds.	Clear, with clouds.	Changeable.	Cloudy.	Rain.	Snow.	Fog.	Total thunder-storms.	Total earthquakes.
January	11	32	111	55	58	118	15	0	5
February	9	33	86	69	51	94	29	0	2
March	3	26	112	76	51	134	10	2	3
April	4	26	104	76	91	96	16	2	4
May	2	29	105	81	106	31	49	1	1
June	6	24	95	85	83	4	76	0	1
July	0	22	118	77	75	0	75	1	1
August	5	29	106	77	113	2	62	2	4
September	2	28	107	73	143	39	33	3	3
October	2	21	115	91	113	90	18	5	7
November	3	29	88	90	84	126	9	1	1
December	6	13	116	82	47	132	6	0	0
Total	53	312	1,263	932	1,015	866	398	17	32

* Part of each of these years. Three observations each day.

Thunder-storms and earthquakes noted in the above period.

Year.	Thunder-storms.	Earthquakes.
1825	1	7
1826	2	5
1830	0	2
1831	4	4
1832	6	7
1833	4	4
1829 and 1834	0	3
Total	17	32

Journal of meteorological observations at the village of Iliuliuk, island of Unalashka, from October, 1866, to April, 1867, by the Rev. Innocent Shyashnikof, priest of the Unalashka district.

Time.	Hours.	Thermometer, Fahrenheit.	Daily mean.	Direction and force of the wind.	Weather.
1866.		°	°		
Oct. 29	8 a. m	40	.....	NW., moderate	Sunshine and clouded.
	Noon	50	.....	WNW., moderate	Sky interchanging the whole day.
	8 p. m	42	44.0	do	
30	8 a. m	40	.....	SSW., light	Sunshine and clouded.
	Noon	48	.....	SSE., moderate	Sky interchanging.
	8 p. m	46	44.7	SSW., moderate	Overcast or gloomy.
31	8 a. m	40	.....	do	Clear.
	Noon	43	.....	WSW., moderate	Sunshine.
	8 p. m	41	41.3	do	Cloudy and at times rain.
Nov. 1	8 a. m	40	.....	WSW., fresh	Sunshine and clear all day, but in the evening rain.
	Noon	42	.....	do	
	8 p. m	39	40.3	do	
2	8 a. m	38	.....	W., moderate	Sunshine and clear, but at times a wet snow falling.
	Noon	40	.....	do	
	8 p. m	36	38.0	do	
3	8 a. m	36	.....	E., very strong	Overcast or gloomy, and much wet snow and strong rain.
	Noon	38	.....	ESE., very strong	
	8 p. m	40	38.0	SSW., moderate	Clear and at times rain.
4	8 a. m	40	.....	SSE., fresh	Clear and sunshine, showers.
	Noon	44	.....	SSE., moderate	Clear and sunshine.
	8 p. m	41	41.7	do	Clear and sunshine, with showers.
5	8 a. m	39	.....	WNW., fresh	Overcast, wet snow.
	Noon	38	.....	NW., very strong	Overcast, hail.
	8 p. m	33	36.7	do	Do.
6	8 a. m	33	.....	W., moderate	Sunshine and at times hail, clear, and clouded.
	Noon	39	.....	SW., moderate	
	8 p. m	36	36.0	SSE., light	Overcast and fine snow.
7	8 a. m	30	.....	NW., moderate	Sunshine, at times snow.
	Noon	38	.....	do	Clear and sunshine.
	8 p. m	30	32.7	do	Overcast, at times snow.
8	8 a. m	29	.....	NW., moderate	Clear and sunshine, without clouds.
	Noon	41	.....	do	
	8 p. m	38	36.0	ESE., fresh	Overcast and wet snow.
9	8 a. m	39	.....	Calm	Overcast and dark.
	Noon	44	.....	WSW., light	Clear and sunshine, without clouds.
	8 p. m	38	40.3	SSW., light	
10	8 a. m	33	.....	do	Do.
	Noon	44	.....	NNE., light	Do.
	8 p. m	29	35.3	do	Do.
11	8 a. m	35	.....	do	Cloudy and at times snow.
	Noon	41	.....	do	Clear and sunshine.
	8 p. m	29	35.0	do	Clear and without clouds.
12	8 a. m	26	.....	do	Do.
	Noon	33	.....	do	Clear, sunshine, and without clouds.
	8 p. m	26	28.3	do	Clear and without clouds.
13	8 a. m	26	.....	NNE., fresh	Do.
	Noon	37	.....	do	Do.
	8 p. m	36	36.3	do	Do.
14	8 a. m	34	.....	do	Do.
	Noon	35	.....	do	Clear, sunshine, clouds.
	8 p. m	32	33.7	NNW., fresh	Clear and variable.
15	8 a. m	29	.....	NW., moderate	Cloudy and occasional snow.
	Noon	36	.....	WNW., moderate	Do.
	8 p. m	33	32.7	W., moderate	Do.
16	8 a. m	27	.....	NNE., light	Clear and without clouds.
	Noon	41	.....	do	Do.
	8 p. m	32	33.3	NNW., fresh	Cloudy and occasional snow.
17	8 a. m	32	.....	NNE., moderate	Clear and without clouds.
	Noon	39	.....	do	Clear, sunshine, clouds.
	8 p. m	32	34.3	do	Do.
18	8 a. m	38	.....	SE., very fresh	Gloomy and at times snow.
	Noon	40	.....	ESE., very fresh	Overcast and wet snow.
	8 p. m	40	39.7	do	Overcast and rain.
19	8 a. m	41	.....	E., very fresh	Do.
	Noon	42	.....	do	Do.
	8 p. m	38	40.3	ENE., very fresh	Do.
20	8 a. m	40	.....	E., fresh	Do.
	Noon	41	.....	ENE., fresh	Do.
	8 p. m	38	39.7	NNE., very fresh	Cloudy and at times rain.
21	8 a. m	39	.....	NE., moderate	Overcast and at times rain.
	Noon	42	.....	ENE., moderate	Do.
	8 p. m	39	40.0	do	Cloudy and at times rain.
22	8 a. m	32	.....	NNE., moderate	Cloudy.
	Noon	42	.....	do	Do.
	8 p. m	41	38.3	do	Overcast and rain.
23	8 a. m	37	.....	NE., moderate	Do.
	Noon	42	.....	do	Do.
	8 p. m	41	40.0	do	Do.
24	8 a. m	39	.....	NNE., light	Overcast and wet snow.
	Noon	40	.....	do	Do.
	8 p. m	35	38.0	NNE., moderate	Do.
25	8 a. m	35	.....	W., moderate	Cloudy.
	Noon	42	.....	do	Do.
	8 p. m	35	37.3	WNW., very fresh	Overcast, wet snow.
26	8 a. m	30	.....	NW., fresh	Cloudy and at times snow.
	Noon	34	.....	do	Clear and sunshine.
	8 p. m	30	31.3	do	Cloudy and at times snow.
27	8 a. m	29	.....	WNW., moderate	Do.
	Noon	40	.....	NNE., light	Clear and without clouds.

Journal of meteorological observations, &c.—Continued.

Time.	Hours.	Thermometer, Fahrenheit.	Daily mean.	Direction and force of the wind.	Weather.
1866.		°	°		
Nov. 27	8 p. m	34	34.3	ENE., fresh	Overcast, snow.
28	8 a. m	34	.....	NE., fresh	Do.
	Noon	38	.....	NE., moderate	Do.
	8 p. m	36	36.0	NNE., fresh	Cloudy and at times hailing.
29	8 a. m	26	.....	Calm	Clear and sunshine.
	Noon	35	.....	do	Overcast, snow.
	8 p. m	34	31.7	NNE., fresh	Cloudy and at times snow.
30	8 a. m	31	.....	.....	Do.
	Noon	31	.....	.....	Clear, clouds.
	8 p. m	29	30.3	.....	Do.
Dec. 1	8 a. m	29	.....	.....	Cloudy and at times snow.
	Noon	28	.....	.....	Gloomy and thick snow.
	8 p. m	25	27.3	.....	Gloomy and at times snow.
Dec. 2	8 a. m	24	.....	.....	Cloudy and at times snow.
	Noon	24	.....	.....	Do.
	8 p. m	25	24.3	.....	Do.
3	8 a. m	20	.....	.....	Do.
	Noon	34	.....	.....	Clear and sunshine.
	8 p. m	25	26.3	.....	Cloudy and thick snow.
4	8 a. m	21	.....	.....	Cloudy and at times snow.
	Noon	30	.....	.....	Do.
	8 p. m	24	25.0	.....	Cloudy and at times snow.
5	8 a. m	24	.....	.....	Clear and variable.
	Noon	28	.....	.....	Do.
	8 p. m	28	26.6	.....	Cloudy and pouring rains.
6	8 a. m	32	.....	.....	Do.
	Noon	39	.....	.....	Cloudy, rain, and snow.
	8 p. m	39	36.6	.....	Cloudy and rain.
7	8 a. m	39	.....	E., fresh	Overcast, rain, and snow.
	Noon	40	.....	NNE., light	Cloudy and at times rain.
	8 p. m	38	39.0	do	Do.
8	8 a. m	39	.....	SSE., moderate	Clear and variable.
	Noon	40	.....	do	Do.
	8 p. m	39	39.3	SW., moderate	Do.
9	8 a. m	38	.....	do	Clear, sunshine.
	Noon	35	.....	do	Do.
	8 p. m	36	34.6	SE., fresh	Cloudy.
10	8 a. m	38	.....	ENE., very fresh	Overcast and much rain.
	Noon	42	.....	do	Do.
	8 p. m	40	40.0	do	Cloudy and fine rain
11	8 a. m	39	.....	SSW., very fresh	Cloudy and at times rain.
	Noon	40	.....	SW., very fresh	Cloudy and heavy rains.
	8 p. m	38	39.0	SSE., moderate	Cloudy and at times rain.
12	8 a. m	36	.....	do	Do.
	Noon	44	.....	do	Do.
	8 p. m	33	37.6	do	Do.
13	8 a. m	37	.....	do	Do.
	Noon	41	.....	do	Do.
	8 p. m	38	38.6	do	Do.
14	8 a. m	35	.....	SSW., moderate	Cloudy.
	Noon	39	.....	do	Sunshine and at times rain.
	8 p. m	35	.....	do	Do.
15	8 a. m	37	.....	E., very fresh	Dark and fine rain.
	Noon	38	.....	ENE., very strong	Cloudy and wet snow.
	8 p. m	38	37.6	ESE., very fresh	Cloudy and at times rain.
16	8 a. m	39	.....	E., very fresh	Cloudy and heavy rain.
	Noon	43	.....	do	Do.
	8 p. m	41	41.0	do	Do.
17	8 a. m	36	.....	NE., light	Cloudy and thick snow.
	Noon	39	.....	Calm	Clear and sunshine.
	8 p. m	36	37.0	SSE., moderate	Cloudy and at times rain.
18	8 a. m	36	.....	do	Do.
	Noon	39	.....	do	Do.
	8 p. m	35	36.6	do	Do.
19	8 a. m	35	.....	Calm	Cloudy and heavy snow.
	Noon	39	.....	do	Fog and fine snow.
	8 p. m	37	37.0	ENE., moderate	Cloudy.
20	8 a. m	34	.....	SW., moderate	Cloudy and at times rain.
	Noon	39	.....	SSW., moderate	Do.
	8 p. m	36	36.3	SSW., fresh	Do.
21	8 a. m	31	.....	N., fresh	Cloudy.
	Noon	30	.....	N., very fresh	Cloudy and at times snow.
	8 p. m	26	29.0	do	Cloudy.
22	8 a. m	26	.....	Calm	Do.
	Noon	29	.....	NE., fresh	Dark, pouring rains.
	8 p. m	34	29.6	ENE., very fresh	Do.
23	8 a. m	30	.....	NNE., moderate	Clear and no clouds.
	Noon	37	.....	NNE., light	Clear and sunshine.
	8 p. m	34	33.3	ENE., fresh	Cloudy.
24	8 a. m	30	.....	NNE., fresh	Clear and without clouds.
	Noon	35	.....	do	Cloudy and at times snow.
	8 p. m	26	30.3	NNE., light	Clear and without clouds.
25	8 a. m	25	.....	do	Do.
	Noon	35	.....	do	Clear, sunshine, clouds.
	8 p. m	35	31.6	NNE., fresh	Cloudy.
26	8 a. m	37	.....	NE., moderate	Dark, rain.
	Noon	42	.....	do	Do.
	8 p. m	37	38.6	NNE., very fresh	Dark and wet snow.
	8 a. m	34	.....	do	Do.

*Mean temperature for November, 36°.1. Wind, NNE. Rain, snow.

Journal of meteorological observations, &c.—Continued.

Time.	Hours.	Thermometer, Fahrenheit.	Daily mean.	Direction and force of the wind.	Weather.
1866.		°	°		
Dec. 27	Noon	30	.....	NNW., very strong	Dark and at times snow.
	8 p. m	29	31.6	NW., very strong	Dark and snow.
28	8 a. m	31	.....	WNW., fresh	Dark and at times snow.
	Noon	33	.....	do	Do.
	8 p. m	36	33.3	W., fresh	Do.
29	8 a. m	30	.....	WNW., fresh	Do.
	Noon	31	.....	do	Do.
	8 p. m	30	30.3	do	Do.
30	8 a. m	23	.....	NNE., light	Clear and without clouds.
	Noon	31	.....	Calm	Clear and sunshine.
	8 p. m	36	30.0	ENE., moderate	Cloudy and at times rain.
31	8 a. m	36	.....	ESE., moderate	Do.
	Noon	39	.....	ESE., fresh	Do.
(*)	8 p. m	36	37.0	ENE., fresh	Dark and wet snow.
1867.					
Jan. 1	8 a. m	35	.....	E., moderate	Dark and heavy rain.
	Noon	36	.....	ESE., moderate	Cloudy and at times rain.
	8 p. m	36	36.6	E., moderate	Dark and heavy rain.
2	8 a. m	36	.....	SSE., light	Cloudy and at times rain.
	Noon	39	.....	SSW., moderate	Do.
	8 p. m	36	37.0	ESE., very fresh	Dark and fine snow.
3	8 a. m	36	.....	S., fresh	Cloudy and at times snow.
	Noon	37	.....	do	Do.
	8 p. m	36	36.3	SSW., moderate	Do.
4	8 a. m	32	.....	do	Do.
	Noon	39	.....	S., moderate	Do.
	8 p. m	35	35.3	NNE., very fresh	Dark and wet snow.
5	8 a. m	35	.....	NNE., light	Do.
	Noon	38	.....	do	Clear and sunshine.
	8 p. m	36	36.3	NNE., fresh	Cloudy.
6	8 a. m	34	.....	NNE., fresh	Dark and fine snow.
	Noon	35	.....	do	Cloudy and fine snow.
	8 p. m	32	33.3	NNW., moderate	Clear and without clouds.
7	8 a. m	32	.....	N., very fresh	Cloudy.
	Noon	33	.....	do	Dark and fine snow.
	8 p. m	34	33.0	NNE., very strong	Dark and heavy.
8	8 a. m	33	.....	W., very fresh	Dark and fine snow.
	Noon	35	.....	WSW., fresh	Dark and snow at times.
	8 p. m	33	33.3	SSW., fresh	Do.
9	8 a. m	33	.....	SSW., moderate	Cloudy and snow at times.
	Noon	37	.....	do	Clear and sunshine.
	8 p. m	28	32.6	SSW., light	Clear and without clouds.
10	8 a. m	27	.....	do	Cloudy.
	Noon	38	.....	SSE., light	Do.
	8 p. m	35	33.3	ESE., light	Do.
11	8 a. m	35	.....	ENE., moderate	Dark and snow.
	Noon	36	.....	NE., moderate	Dark and fine rain.
	8 p. m	37	36.0	NNE., moderate	Do.
12	8 a. m	34	.....	do	Dark and rain.
	Noon	41	.....	do	Dark and snow.
	8 p. m	43	36.0	N., fresh	Do.
13	8 a. m	30	.....	do	Clear and without clouds.
	Noon	32	.....	do	Do.
	8 p. m	29	30.3	N., very fresh	Do.
14	8 a. m	26	.....	NNW., very fresh	Clear and at times clouds.
	Noon	27	.....	do	Do.
	8 p. m	26	26.3	N., very fresh	Do.
15	8 a. m	25	.....	NNW., very fresh	Cloudy and at times snow.
	Noon	24	.....	do	Do.
	8 p. m	24	24.3	N., very fresh	Do.
16	8 a. m	30	.....	NNE., fresh	Clear and sunshine.
	Noon	31	.....	do	Cloudy.
	8 p. m	28	29.6	do	Do.
17	8 a. m	26	.....	do	Do.
	Noon	30	.....	do	Do.
	8 p. m	31	29.0	NNW., very fresh	Cloudy and at times snow.
18	8 a. m	25	.....	N., fresh	Clear and at times clouds.
	Noon	29	.....	do	Do.
	8 p. m	26	26.6	NNW., fresh	Cloudy.
19	8 a. m	29	.....	NNW., moderate	Cloudy and at times snow.
	Noon	35	.....	N., moderate	Clear and sunshine.
	8 p. m	26	30.0	do	Clear and without clouds.
20	8 a. m	19	.....	NNE., light	Do.
	Noon	32	.....	do	Clear and sunshine.
	8 p. m	28	26.3	Calm	Clear and at times clouds.
21	8 a. m	26	.....	do	Do.
	Noon	38	.....	do	Clear and sunshine.
	8 p. m	29	31.0	do	Clear and without clouds.
22	8 a. m	31	.....	do	Do.
	Noon	37	.....	ENE., moderate	Do.
	8 p. m	29	32.3	Calm	Do.
23	8 a. m	25	.....	NNE., moderate	Clear and at times clouds.
	Noon	34	.....	do	Do.
	8 p. m	30	29.6	ENE., moderate	Cloudy.
24	8 a. m	34	.....	NE., fresh	Overcast or dark and fine snow.
	Noon	35	.....	do	Overcast and heavy snow.
	8 p. m	33	34.0	do	Overcast and at times snow.
25	8 a. m	34	.....	NNE., moderate	Clear and cloudy.
	Noon	34	.....	N., fresh	Do.

*Mean temperature for December, 33°.87.

Journal of meteorological observations, &c.—Continued.

Time.	Hours.	Thermometer, Fahrenheit.	Daily mean.	Direction and force of the wind.	Weather.
1867.		°	°		
Jan. 25	8 p. m	28	30.3	do	Clear and without clouds.
26	8 a. m	27	.....	NW., moderate	Cloudy.
	Noon	33	.....	WNW., moderate	Clear and sunshine.
	8 p. m	25	28.3	NNW., moderate	Clear and without clouds.
27	8 a. m	25	.....	Calm	Clear and at times clouds.
	Noon	32	.....	W., moderate	Cloudy and at times snow.
	8 p. m	26	30.6	do	Clear and at times clouds.
28	8 a. m	35	.....	do	Clear and without clouds.
	Noon	36	.....	SW., moderate	Cloudy and at times snow.
	8 p. m	35	35.3	Calm	Do.
29	8 a. m	36	.....	E., fresh	Clear and without clouds.
	Noon	38	.....	do	Cloudy.
	8 p. m	35	36.3	NE., very strong	Do.
30	8 a. m	36	.....	ENE., very strong	Dark and wet snow.
	Noon	38	.....	NE., fresh	Dark and fine snow.
	8 p. m	35	36.3	do	Dark and at times rain.
31	8 a. m	29	.....	N., gale	Dark and fine snow.
	Noon	27	.....	do	Cloudy.
(*)	8 p. m	21	26.6	do	Cloudy and snow.
Feb. 1	8 a. m	20	.....	do	Cloudy and at times snow.
	Noon	22	.....	NNW., fresh	Do.
	8 p. m	20	20.7	NW., fresh	Do.
2	8 a. m	15	.....	do	Do.
	Noon	16	.....	do	Do.
	8 p. m	13	14.7	do	Do.
3	8 a. m	17	.....	do	Do.
	Noon	20	.....	NNW., fresh	Do.
	8 p. m	13	16.7	N., very fresh	Do.
4	8 a. m	16	.....	NNW., fresh	Cloudy.
	Noon	20	.....	do	Cloudy and at times snow.
	8 p. m	17	17.7	WNW., moderate	Cloudy.
5	8 a. m	27	.....	ENE., very fresh	Dark and snow.
	Noon	31	.....	do	Dark.
	8 p. m	34	30.7	NE., moderate	Dark and snow.
6	8 a. m	30	.....	Calm	Clear and without clouds.
	Noon	44	.....	do	Clear, sunshine, and clouds.
	8 p. m	33	35.7	do	Cloudy and at times snow.
7	8 a. m	32	.....	do	Do.
	Noon	49	.....	do	Do.
	8 p. m	34	38.3	SSE., moderate	Clear and at times clouds.
8	8 a. m	30	.....	SSW., moderate	
	Noon	44	.....	SW., moderate	
	8 p. m	33	35.6	ESE., very fresh	
9	8 a. m	39	.....	S., fresh	
	Noon	42	.....	SW., fresh	
	8 p. m	33	38.0	do	
10	8 a. m	32	.....	SSW., fresh	
	Noon	36	.....	do	
	8 p. m	32	33.3	ESE., fresh	
11	8 a. m	36	.....	SSE., moderate	
	Noon	45	.....	do	
	8 p. m	35	38.6	Calm	
12	8 a. m	27	.....	WNW., very strong	
	Noon	28	.....	NW., fresh	
	8 p. m	26	27.0	NNW., fresh	
13	8 a. m	29	.....	Calm	
	Noon	34	.....	do	
	8 p. m	36	32.0	SW., moderate	
14	8 a. m	44	.....	S., moderate	Cloudy.
	Noon	45	.....	do	Do.
	8 p. m	48	45.6	do	Do.
15	8 a. m	40	.....	do	Do.
	Noon	52	.....	do	Clear without clouds.
	8 p. m	42	44.6	do	Cloudy and at times rain.
16	8 a. m	37	.....	SSW., fresh	Cloudy and at times hail.
	Noon	37	.....	SW., fresh	Dark and at times snow.
	8 p. m	34	36.0	SSW., fresh	Clear and without clouds.
17	8 a. m	26	.....	Calm	Do.
	Noon	42	.....	do	Clear, sunshine, and clouds.
	8 p. m	34	34.0	ENE., fresh	Cloudy.
18	8 a. m	34	.....	ENE., very fresh	Dark and wet snow.
	Noon	36	.....	SW., very fresh	Do.
	8 p. m	35	35.0	do	Do.
19	8 a. m	34	.....	WNW., fresh	Clear and at times cloudy.
	Noon	38	.....	WNW., moderate	Clear and without clouds.
	8 p. m	29	33.3	NNE., moderate	Do.
20	8 a. m	39	.....	S., fresh	Cloudy.
	Noon	44	.....	do	Dark and fine snow.
	8 p. m	42	41.6	do	Cloudy.
21	8 a. m	44	.....	do	Do.
	Noon	48	.....	do	Do.
	8 p. m	38	43.3	S., moderate	Clear and dark weather.
22	8 a. m	37	.....	SW., fresh	Clear and without clouds.
	Noon	44	.....	WSW., fresh	Do.
	8 p. m	34	38.3	do	Cloudy.
23	8 a. m	35	.....	WSW., moderate	Clear and without clouds.
	Noon	36	.....	W., moderate	Cloudy and at times snow.
	8 p. m	34	35.0	SW., fresh	Do.

*Mean temperature for January, 31°.66.

Journal of meteorological observations, &c.—Continued.

Time.	Hours.	Thermometer, Fahrenheit.	Daily mean.	Direction and force of the wind.	Weather.
1867.		°	°		
Feb. 24	8 a. m	26	.....	WNW., very fresh	Cloudy.
	Noon	25	.....	NNW., very fresh	Do.
	8 p. m	21	24.0	N., fresh	Do.
25	8 a. m	26	.....	Calm	Clear and without clouds.
	Noon	29	.....	do	Do.
	8 p. m	17	24.0	do	Do.
26	8 a. m	32	.....	do	Clear, sunshine, without clouds.
	Noon	35	.....	ESE., moderate	Do.
	8 p. m	33	33.3	SE., fresh	Cloudy.
27	8 a. m	39	.....	SSE., fresh	Do.
	Noon	41	.....	do	Do.
	8 p. m	35	38.5	do	Do.
28	8 a. m	36	.....	do	Clear, sunshine, and at times clouds.
	Noon	40	.....	do	Do.
(*)	8 p. m	34	36.6	SE., fresh	Clear and without clouds.
Mar. 1	8 a. m	35	.....	SSE., light	Clear, sunshine, without clouds.
	Noon	39	.....	Calm	Do.
	8 p. m	32	35.3	do	Do.
2	8 a. m	33	.....	do	Do.
	Noon	43	.....	do	Do.
	8 p. m	28	34.6	do	Do.
3	8 a. m	32	.....	do	Cloudy.
	Noon	45	.....	do	Clear and without clouds.
	8 p. m	32	36.3	do	Cloudy.
4	8 a. m	32	.....	NNE., moderate	Clear and without clouds.
	Noon	36	.....	do	Clear, sunshine, without clouds.
	8 p. m	32	33.3	NNE., fresh	Clear and at times clouds.
5	8 a. m	35	.....	NE., moderate	Dark and fine snow.
	Noon	43	.....	do	Dark and wet snow.
	8 p. m	36	38.0	ENE., moderate	Dark and rain.
6	8 a. m	37	.....	do	Dark and wet snow.
	Noon	39	.....	E., moderate	Dark and heavy rain.
	8 p. m	35	.....	ENE., light	Dark and fine snow.
7	8 a. m	29	.....	SW., fresh	Cloudy.
	Noon	41	.....	do	Clear and sunshine, no clouds.
	8 p. m	29	36.3	Calm	Clear and without clouds.
8	8 a. m	35	.....	ENE., fresh	Dark and fine snow.
	Noon	37	.....	E., very fresh	Dark and fine rain.
	8 p. m	35	35.6	do	Dark and heavy rain.
9	8 a. m	38	.....	ESE., very fresh	Do.
	Noon	40	.....	do	Clear and at times rain.
	8 p. m	36	38.0	E., very fresh	Gloomy and heavy rain.
10	8 a. m	36	.....	SE., fresh	Cloudy and at times rain.
	Noon	45	.....	SSE., fresh	Do.
	8 p. m	34	38.3	do	Cloudy and at times rain.
11	8 a. m	32	.....	ENE., fresh	Dark and thick snow.
	Noon	42	.....	SSE., fresh	Cloudy and at times snow.
	8 p. m	34	35.6	SSE., moderate	Do.
12	8 a. m	31	.....	Calm	Clear, sunshine, without clouds.
	Noon	43	.....	do	Do.
	8 p. m	29	36.3	do	Do.
13	8 a. m	37	.....	do	Do.
	Noon	42	.....	do	Do.
	8 p. m	32	36.0	do	Do.
14	8 a. m	34	.....	SSE., fresh	Cloudy.
	Noon	39	.....	do	Do.
	8 p. m	37	37.0	NE., fresh	Do.
15	8 a. m	35	.....	NNE., fresh	Dark and thick snow.
	Noon	47	.....	NNW., moderate	Cloudy.
	8 p. m	35	39.0	WNW., light	Do.
16	8 a. m	33	.....	Calm	Do.
	Noon	48	.....	do	Clear, sunshine, and cloudy.
	8 p. m	35	38.6	ENE., fresh	Dark and wet snow.
17	8 a. m	40	.....	SSE., moderate	Cloudy.
	Noon	45	.....	SSE., light	Do.
	8 p. m	36	40.3	do	Cloudy and at times rain.
18	8 a. m	38	.....	do	Do.
	Noon	40	.....	do	Do.
	8 p. m	31	36.3	Calm	Clear and without clouds.
19	8 a. m	38	.....	do	Cloudy.
	Noon	44	.....	SSE., light	Do.
	8 p. m	37	39.6	E., fresh	Gloomy and heavy rain.
20	8 a. m	45	.....	S., fresh	Clear, sunshine, at times clouds.
	Noon	46	.....	do	Do.
	8 p. m	42	44.3	ESE., fresh	Dark and rain.
21	8 a. m	44	.....	SSE., fresh	Clear and at times rain.
	Noon	45	.....	do	Clear, sunshine, at times clouds.
	8 p. m	40	43.0	ESE., fresh	Gloomy and heavy rain.
22	8 a. m	42	.....	SSE., fresh	Cloudy and at times rain.
	Noon	49	.....	do	Cloudy.
	8 p. m	39	43.6	SSW., fresh	Do.
23	8 a. m	38	.....	SSE., fresh	Do.
	Noon	43	.....	do	Clear, sunshine, without clouds.
	8 p. m	42	41.0	ESE., fresh	Dark and rain.
24	8 a. m	41	.....	SE., fresh	Do.
	Noon	44	.....	do	Cloudy.
	8 p. m	37	40.6	SSW., moderate	Do.
25	8 a. m	42	.....	do	Dark and fine snow.
	Noon	43	.....	do	Cloudy.

* Mean temperature for February, 33°.32.

Journal of meteorological observations, &c.—Continued.

Time.	Hours.	Thermometer, Fahrenheit.	Daily mean.	Direction and force of the wind.	Weather.
1867.		°	°		
Mar. 26	8 p. m	36	40.3	W., moderate	Cloudy.
	8 a. m	32	.....	do	Dark and snow.
	Noon	34	.....	WSW., moderate	Do.
	8 p. m	28	31.3	NW., fresh	Cloudy.
27	8 a. m	25	.....	N., gale	Do.
	Noon	23	.....	N., very strong	Cloudy and at times snow.
	8 p. m	21	23.0	NW., fresh	Dark and at times snow.
28	8 a. m	23	.....		Cloudy.
	Noon	25	.....		Do.
	8 p. m	27	28.3	SE., fresh	Dark and snow.
29	8 a. m	37	.....	SW., fresh	Cloudy and at times snow.
	Noon	42	.....	do	Clear, sunshine, without clouds.
	8 p. m	35	38.0	W., very fresh	Dark and snow.
30	8 a. m	29	.....	N., fresh	Cloudy.
	Noon	26	.....	do	Do.
*	8 p. m	24	29.6	SE., moderate	Do.

* Mean temperature for thirty days in March, 36.°81.

SUMMARY.

Month.	Mean temperature.	Daily maximum.	Daily minimum.	No cloudless days.
	°	°	°	
November, 1866	36.1	41.7	30.3	2
December, 1866	33.9	41.0	24.3	0
January, 1867	31.7	37.0	24.3	0
February, 1867	33.3	45.6	14.7	0
March, 1867	36.8	44.3	22.0	4

PART III.—PLANTS.

NOTE.—The matter inclosed by parentheses, and including the initial T, has been added to the list of plants given by Dr. J. T. Rothrock.*

RANUNCULACEÆ.

Thalictrum alpinum, L., Kotzebue Sound and Port Clarence.

Anemone alpina, L., Kotzebue Sound.

Anemone patens, L., Fort Yukon.

Anemone parviflora, MICHX., Kotzebue Sound.

Anemone richardsoni, HOOK., Unalashka, Kotzebue Sound, Yukon River.

Anemone narcissiflora, L., (=*A. multifida* of HOOKER). "Kotzebue Sound, Point Barrow to Mackenzie River, Unalashka Island. (This species is abundant throughout the Aleutian Islands, attaining a height of 1 foot. The early spring growth on the upper end of the root is eaten by the natives of those islands. It has a waxy, farinaceous taste which is not disagreeable. T.)

Hepatica triloba, CHAIX., Sitka.

Ranunculus pallasii, SCHLECHT., Kotzebue Sound.

Ranunculus hyperboreus, ROTTB., Norton Sound to Wainwright Inlet.

R. purshii, RICHARDS., Kotzebue Sound.

R. lapponicus, L., Kotzebue Sound.

R. pygmæus, WAHL., Kotzebue Sound.

R. nivalis, R. BR., Kotzebue Sound.

R. eschscholtzii, SCHLECHT., Kotzebue Sound to Cape Lisburne.

R. occidentalis, NUTT., (*R. recurvatus*, BONGARD in Vegetation of Sitka, but *not* of POIR), Sitka.

(*R. fluviatilis*, L., Atkha and Attu Islands. Quite common in the running streams of water, and occasionally in the upland pools. T.)

(*R. nelsoni*, D C. Abundant throughout the Aleutian Islands. Attains a height of 15 inches. T.)

Caltha palustris, L., var. *asarifolia*, Unalashka, ROTHROCK. (All Aleutian Islands, quite com- the lower hill-slopes. T.)

C. leptosepala, D C. Sitka.

C. arctica, R. BR., This species doubtless occurs in the extreme northeast part of the territory.

Coptis infolia, SALISB., Sitka.

C. asplenifolia, SALISB., Sitka.

(*C. trifolia*, SALISB., Common throughout the Aleutian Islands and mainland coast, growing solitary, 2 to 3 inches high. This species was collected also at an elevation of 1,300 feet at Atkha Island. T.)

Aquilegia formosa, FISCH., (= *A. canadensis*, BONG). Sitka.

Delphinium menziesii, D C. Kotzebue Sound to Cape Lisburne.

Aconitum napellus, L., var. *delphinifolium*, SMITH. Sitka, Kotzebue Sound, Chamisso Island, Norton Sound, and between Point Barrow and Mackenzie River. (Quite common through the entire Aleutian chain. T.)

NYMPHÆACEÆ.

Nuphar luteum, SMITH. Sitka. (This species grows vigorously in a shallow lake on the south- west side of Attu Island. T.)

* Sketch of the Flora of Alaska, by J. T. Rothrock, M. D. (Smithsonian Report for 1867, pp. 433–463.)

PAPAVERACEÆ.

Papaver alpinum, L., *P. nudicaule.* Norton Sound, Kotzebue Sound, and from Point Barrow to Mackenzie River. (*Nudicaule* occurs sparingly in the rocky bed of the creek beyond the large lake southeast of the village of Iliuliuk on Unalashka Island. It was not observed on any other island, though carefully searched for. T.)

FUMARIACEÆ.

Corydalis pauciflora, PERS., Norton Sound, island of Saint Lawrence.

C. glauca, PURSH. Point Barrow to Mackenzie River.

CRUCIFERÆ.

Barbarea vulgaris, R. BR., Sitka and Norton Sound. All Aleutian Islands. (T.)

Arabis hirsuta, SCOP., Sitka and Unalashka. (All the Aleutian Islands. T.)

(*Arabis petræa*, L., var. *ambigua*, REGEL. Sitka and throughout Aleutian Chain. T.)

Nasturtium palustre, D C., Eschholtz Bay, Unalashka, and Yukon River.

Cardamine lenensis, ANDRE. Island of Saint Lawrence, Unalashka, Sitka.

C. pratensis, L., Kotzebue Sound, Point Barrow, to Mackenzie River; (Norton Sound and throughout the Aleutian Islands. T.)

C. hirsuta, L., Unalashka and Sitka, (Atkha Island. Common. T.)

C. purpurea, CHAM., Kotzebue Sound, Wainwright Inlet, Unalashka.

C. digitata, RICHARDS., (Possibly only a form of *C. pratensis;* see J. D. Hooker in Outlines of the Distribution of Arctic Plants.) Wainwright Inlet, island of Saint Lawrence, and between Point Barrow and Mackenzie River.

Alyssum hyperboreum, L., A doubtful native of America. Ledebour, in Flora Rossica, simply tells us (on authority of Steller and Krasch) that it is "in ora occidentale Americæ borealis."

Parrya macrocarpa, R. BR., Kotzebue Sound, Cape Lisburne, between Point Barrow and Mackenzie River, and island of Saint Lawrence.

Draba algida, D C., Island of Saint Lawrence.

D. alpina, L., Kotzebue Sound.

D. glacialis, ADAMS. Cape Lisburne, Assistance Bay, Garry Island.

D. stellata, JACQ., var. *hebecarpa.* Kotzebue Sound, Unalashka, and Saint Lawrence Island (?). (High hill-tops of Aleutian Islands, rare. T.)

D. hirta, L., Kotzebue Sound.

D. incana, L., Garry Island, Saint Lawrence Island, Unalashka, (all the Aleutian Islands. Quite common. T.)

D. gracilis, LEDEB., Unalashka.

D. borealis, D C. Islands of Saint Lawrence and Unalashka. According to J. D. Hooker this species is perhaps only a leafy form of *D. incana.*

D. unalaschkiana, D C., "A var. *D. borealis*" (?), *Ledebour*, op. cit. at Unalashka.

D. stenoloba, LEDEB., Unalashka.

D. muricella, WAHL., *D. nivalis*, LILJEBL., Wainwright Inlet.

D. grandis, LANGSDORFF. Sitka, Unalashka.

Cochlearia fenestrata, R. BR., Norton Sound to Point Barrow and Assistance Bay.

C. oblongifolia, D C. Sitka, Kotzebue Sound, Wainwright Inlet, and between Point Barrow and Mackenzie River, Norton Sound.

C. anglica, L., Kotzebue Sound and Assistance Bay.

(*Cochlearia officinalis*, L., Saint Michael's. Seven inches high, not very common; abundant throughout the Aleutian Islands. T.)

Tetrapoma pyriforme, SEEMANN. Tab. 2, Bot. of Voyage of the Herald. Probably introduced by the Russians, as it has not been found elsewhere than at Saint Michael's.

Hesperis pallasii, T. and G. Kotzebue Sound and Cape Lisburne.

Sisymbrium sophia, L., var. *sophioides.* Kotzebue Sound and between Point Barrow and Mackenzie River.

Erysimum lanceolatum, R. BR., Arctic coast, Pullen.
Eutrema edwardsii, R. BR., Saint Lawrence.
Aphragmus eschscholtzianus, ANDRZ., Unalashka.
Hutchinsia calycina, DESV., Kotzebue Sound and Cape Kruzenstern.

VIOLACEÆ.

Viola biflora, L., var. *sitchensis*, REGEL. Sitka.
V. blanda (?), Kotzebue Sound (Botany of Beechey's Voyage).
V. Langsdorffii, FISCH., Kodiak and Unalashka. (This species is quite plentiful on all the Aleutian Islands. The plants found on certain areas of the lower grounds attain a vigorous growth. Those which occur on the island of Attu are quite small and of lighter blue color. T.)

DROSERACEÆ.

Drosera rotundifolia, L., Sitka. (This plant is not common at Saint Michael's, there growing in very small patches. The flowers are white; attains there a height of 2 inches. Among all the Aleutian Islands it occurs plentifully, here attaining a greater size and large patches which remain in color (deep reddish-brown) throughout the entire winter. The leaves exude a viscid substance which allures small dipterous insects, and these are finally absorbed. T.)
Parnassia palustris, L., Norton Sound, Fort Yukon. (Common at bases of ravine sides and hills among the western islands of the Aleutian chain. T.)
P. kotzebuei, CHAM., Port Clarence to Cape Lisburne, Bot. Herald. (Common on the western islands of the Aleutian chain, less so on the eastern islands, growing at the bases of hills. Flowers white. T.)

CARYOPHYLLACEÆ.

Dianthus repens, WILLD., Norton Sound, Kotzebue Sound, Cape Lisburne, and Yukon River banks.
Silene acaulis, L., Kotzebue Sound, Cape Lisburne, and between Point Barrow and Mackenzie River.
Melandryum apetalum, FENZL., Kotzebue Sound and northern coasts.
Spergula saginoides, L., Sitka, Unalashka, and Kotzebue Sound.
S. rubra, T. and G., Sitka.
S. arvensis, L., Sitka.
Arenaria verna, L., (var. *hirta*). Western shore of Northern Alaska.
A. arctica, FENZL., Kotzebue Sound to Cape Lisburne. (This plant was obtained only at Sannák Island, growing in large stools; the heads were of a delicate pink color. Not observed elsewhere on the islands to the westward. T.)
A. macrocarpa, FENZL., Saint Lawrence Island and northwest coast.
Honkeneya peploides, EHR., Northern shores. (Obtained at Atkha Island; not common; grows on the drier hill-sides. T.)
H. peploides, var. *oblongifolia*, EHR., Sitka and Kotzebue Sound.
Merkia physodes, FISCH., Norton Sound to Point Barrow.
Moehringia lateriflora, FENZL., Sitka to Unalashka, Fort Yukon.
Stellaria media, SMITH. Sitka and Unalashka.
S. borealis, BIGELOW. Sitka and Unalashka.
S. borealis, var. *crispa*. Sitka and Unalashka.
S. crassifolia, EHR., Sitka.
S. humifusa, ROTTBL., Sitka, Norton Sound, Kotzebue Sound.
S. longifolia, MUHL., Sitka and Kotzebue Sound.
S. longipes, GOLDIE. Kotzebue Sound, Yukon River.
S. uliginosa, L. (Obtained only at Attu and Atkha Islands, growing under the eaves or in the crevices of the oldest wooden houses. It is quite rare at either place. T.)
Cerastium vulgatum, L., *C. alpinum*, in Bongard's Vegetation of Sitka. (Obtained at Atkha Island among the wet localities on sides of hills. Flowers in early July. T.)

C. vulgatum, L., var. *grandiflorum*, LEDEB., in Flora Rossica. Norton Sound.
C. vulgatum, L., var. *behringianum*, LEDEB., in Flora Rossica. Norton Sound.
(*Sagina linnæi*, PREST., Obtained from the high hill-tops of Atkha Island; not common. T.)

LINACEÆ.

Linum perenne, L., Fort Yukon.

GERANIACEÆ.

Geranium erianthum, D C., Sitka and Unalashka. (Rare at Saint Michael's; abundant throughout the Aleutian Islands. Flowers pale blue. T.)

LEGUMINOSÆ.

Lupinus perennis, L., Kotzebue Sound.

L. nootkatensis, DONN. Unalashka, Fort Yukon. (This plant is very abundant throughout the entire coast line of Alaska, including the Aleutian Islands. It attains a height according to locality, the more northern plants are of small size while on the Aleutian Islands it frequently attains a height of 4 feet. The flowers are pale blue to nearly white, forming a raceme of nearly a foot in length. The root is very large; and, in rich soil, becomes over 15 inches in length by 2 or 3 inches in diameter and of spindle-shape. This plant is called *zhóltia kóren* or "yellow-root," by the Russian-speaking people. About the middle of October the Aleuts dig great quantities of these roots for food. The roots are carefully scraped until the skin is removed, the interior possessing a slightly bitter but farinaceous taste and is eaten either raw or else boiled. When eaten in excess it is apt to produce disagreeable effects, and if oily food is not also eaten soon after the presence of so much woody fiber in the stomach and intestines, is likely to produce fatal inflammation. The roots are frequently the only food that the hunters can obtain during long-continued storms. Several such instances have occurred to my own knowledge. I am not aware that the natives of the mainland make use of this plant for food. A remark concerning the spread of this plant may not be out of place. Near the grave-yard of Iliuliuk village on Unalashka Island in 1878, but few stalks of this plant were to be seen; in 1881 the area was covered with a mass of vigorous stalks and were frequently referred to by others who had noticed their rapid growth. The cattle formerly collected there when they had eaten sufficiently, and their droppings may have favored the increased growth of these plants. T.)

Trifolium repens, L., Sitka; fide Dr. A. Kellogg.

Astragalus frigidus, GRAY. *Phaca frigidus*, L., Kotzebue Sound.

A. alpinus, L., Kotzebue Sound to Point Barrow, Fort Yukon.

A polaris, BENTH., Rediscovered by Seemann at Eschscholtz Bay, in Kotzebue Sound, during the voyage of the Herald. See J. D. Hooker, on Distribution of Arctic Plants.

A. hypoglottis, L., Point Barrow and eastward, Fort Yukon.

Oxytropis campestris, D C., including *O. borealis*, D C. Kotzebue Sound.

O. uralensis, L., Kotzebue Sound and west coast of Alaska.

Vicia gigantea, HOOK., v. *americana*, MUHL., Sitka, Arctic coast.

Lathyrus maritimus, BIGEL., Sitka, west coast of Alaska. (Grows abundantly throughout the coast line of Alaska, south of Cape Lisburne, and including the entire chain of Aleutian Islands. In some localities it becomes very luxuriant, the legumes bearing several seed of considerable size. There is no use made of this plant by the natives; neither is it eaten by the cattle or sheep. T.)

Hedysarum boreale, NUTT., Kotzebue Sound and Cape Lisburne.

H. mackenzii, RICHARDS., Yukon River, 50 miles west of Fort Yukon. Sweetish root, eaten by the Indians.

ROSACEÆ.

Spiræa betulifolia, PALL., Kotzebue Sound.

S. aruncus, L., Sitka.

S. salicifolia, L., Point Barrow to Mackenzie River.

S. pectinata, T. and G., Sitka and about Bering Straits.

Dryas octopetala, L., Kotzebue Sound to Port Clarence and northern shore. Dr. Rothrock says he cannot do otherwise than unite *D. integrifolia*, VAHL., with this species; J. D. Hooker has already done so in his paper quoted above.

Geum macrophyllum, WILLDE., Sitka, Unalashka. (Obtained only at Attu and Unalashka. Not common at Unalashka, and but little more so at Attu. The semi-domesticated young of the white-cheeked goose devour the leaves of this plant so that it is difficult to obtain good specimens of it. Flowers yellow, plant attaining a height of 16 inches. T.)

G. calthifolium, SMITH. Unalashka, Sitka. (Grows among the drier crevices and clefts of rocks along the beach. Usually in stools of variable size. Flowers bright yellow. June to latter part of August. Some of the leaves remain green the entire year. Common throughout the entire Aleutian chain. Rare at Saint Michael's, and there quite stunted. T.)

G. glaciale, ADAMS. Cape Lisburne and Kotzebue Sound; also found on northern shore, west of Mackenzie River.

G. rossii, SERINGE. Unalashka.

Sanguisorba canadensis, L., Banks of Buckland River, Unalashka, Sitka, Fort Yukon, Yukon River banks.

Sibbaldia procumbens, L., Unalashka. (All the Aleutian Islands, rarely exceeding an inch in height. T.)

Potentilla norvegica, L., Sitka, Point Barrow to Mackenzie River.

P. pennsylvanica, L., Kotzebue Sound.

P. anserina, L., Sitka, Kotzebue Sound, Point Barrow, northern coast, Fort Yukon.

P. nana, LEHM., Kotzebue Sound.

P. emarginata, PURSH. Kotzebue Sound, between Point Barrow and Mackenzie River.

P. nivea, L., Kotzebue Sound and coast west of Cape Bathurst, *fide* Botany of the Herald.

P. villosa, PALL., Kotzebue Sound, Unalashka, Sitka. (Common throughout the coast of the mainland and the Aleutian Islands, growing, on rocky places near the beach. Flowers yellow. T.)

P. biflora, LEHM., Kotzebue Sound, Cape Lisburne.

P. fruticosa, L., Kotzebue Sound, banks of Buckland River.

P. palustris, SCOP., Sitka, Saint Lawrence.

Rubus spectabilis, PURSH. Sitka, Kadiak, Cape Saint Elias.

R. arcticus, L., Kotzebue Sound, Saint Michael's.

R. pedatus, SMITH. Sitka.

R. chamæmorus, L., Sitka, north and west coast of Alaska. (Very abundant at Saint Michael's and southward along the entire coast, including Aliaska and Unímak, Akután, Attu, and Agattu, of the Aleutian Islands. It is not found on Unalashka or any of the intermediate islands to Attu. The berries are slightly acid when fully ripe, and are eagerly sought for by the natives, who preserve them by putting them in water and allowing the mass to freeze. Among the Eskimo of Norton Sound the berries are mixed with the back-fat of the reindeer, to form the *talkúsha* of the Russians. The children begin to pick these berries as soon as they have formed in fruit, and eat them in such quantities that scarcely anything else is consumed during the entire day. T.)

(*Rubus stellatus*, SMITH. Not observed at Unalashka; plentiful at Atkha, and less abundant at Attu. Flowers pink; fruit insignificant, scarcely having taste. T.)

R. nutkanus, MOÇ., Sitka.

Rosa cinnamomea, L., Point Barrow to Mackenzie River, Fort Yukon.

Pyrus rivularis, DOUGL., Sitka.

P. sambucifolia, CHAM. and SCHLECHT., Sitka. (A species of "strawberry"; grows abundantly on Akután Island, the fruit being very fragrant and of excellent flavor. At Atkha Island the same species is found sparingly on the path from Nazán Bay to Old Harbor. I have eaten the fruit from both the localities named above, but could not obtain specimens of the plant at the proper season. It is not found on any other of the islands to my knowledge. T.)

ONAGRACEÆ.

Epilobium angustifolium, L., Sitka, Unalashka, Fort Yukon, banks of Yukon River, north and west shores of Alaska. (At Saint Michael's this plant occurs, generally solitary, among the tall grasses on the steeper hillsides, growing to a height of 8 to 17 inches. Flowers pinkish to red. T.)

E. latifolium, L., Norton Sound, Point Barrow, Sitka, Unalashka. (Abundant along the rocky banks of creeks; attains a height of 18 inches. Flowers reddish purple, very showy. The stems are very woody and difficult to break. T.)

E. luteum, PURSH. Sitka, Unalashka. (Abundant throughout the Aleutian Islands, rare at Saint Michael's. Flowers yellow. T.)

E. palustre, L., Kotzebue Sound, *fide* Ledebour, in Flora Rossica.

E. tetragonum, L., Given as a native of this region.

E. roseum, SCHREB., Sitka. (Plentiful throughout the Aleutian Islands; grows in wet localities. T.)

E. alpinum, L., Sitka.

E. affine, BONGARD. Sitka. (Most abundant on the western islands of the Aleutian chain; less common on the eastern islands. Grows 2 feet high. T.)

Circæa alpina, L., Sitka.

Hippuris vulgaris, L., Sitka, Bay of Good Hope.

H. montana, LEDEB., Unalashka.

H. maritima, HELLEN. Kotzebue Sound and delta of river Buckland.

PORTULACACEÆ.

Claytonia virginica, L., Kotzebue Sound.

C. sarmentosa, C. A. MEYER. Cape Lisburne, Kotzebue Sound.

C. flagellaris, BONG., Sitka.

C. sibirica, L., Sitka, Cape Saint Elias. (Abundant throughout the Aleutian Islands, growing amongst rank grasses and other plants. Flowers white to red. T.)

C. chamissonis, ESCHSCHOLTZ. (*C. aquatica*, NUTT. in Flora North America, Torrey and Gray, *fide* Ledebour). Unalashka.

Montia fontana, L., Sitka, Unalashka, Norton Sound, Kotzebue Sound.

CRASSULACEÆ.

Sedum rhodiola, D C. Norton and Kotzebue Sounds.

GROSSULACEÆ.

Ribes rubrum, L., Port Clarence, Kotzebue Sound, Yukon River, (Saint Michael's. T.)

R. hudsonianum, RICHARDS., Yukon River.

R. laxiflorum, PURSH. Cape Saint Elias and Sitka.

R. bracteosum, DOUGL., Sitka.

R. lacustre, PURSH. Point Barrow to Mackenzie River.

SAXIFRAGACEÆ.

Saxifraga oppositifolia, L., Unalashka, Cape Lisburne, Kotzebue Sound, and northern coast.

S. bronchialis, L., Kotzebue Sound, Wainwright Inlet, Unalashka.

S. nitida, SCHREB., Unalashka, *fide* Ledebour, Flora Rossica.

S. eschscholtzii, STERNB., Cape Lisburne, Kotzebue Sound.

S. flagellaris, WILLD., Cape Lisburne, Kotzebue Sound, Assistance Bay.

S. hirculus, L., Norton Sound to Point Barrow, and on northern coast. (Common along the beach and wet places of the lower hillsides of the Aleutian Islands. T.)

S. tricuspidata, RETZ., Kotzebue Sound, Unalashka, Fort Yukon.

S. serpyllifolia, PURSH. Cape Lisburne, Unalashka, Saint Lawrence Island.

S. leucanthemifolia, LAP., (*S. stellaris*, L., var. *brunnoiana*, BONGARD, Veg. Sitka.) Sitka and Cape Prince of Wales.

S. davurica, PALL., (Seemann has united with this species *S. flabellifolia*, and apparently on good grounds.) Cape Lisburne, Kotzebue Sound, Unalashka.

S. nivalis, L., Unalashka, Cape Lisburne, and other stations on the coast.

S. cernua, L., Point Barrow to Mackenzie River.

S. hieracifolia, W. and K., Saint Lawrence, Kotzebue Sound.

S. nelsoniana, DONN (Not of Hooker and Arnott, in Botany of Beechey's Voyage). Norton Sound.

S. spicata, DONN. Sledge Island, Cape Prince of Wales.

S. punctata, L., *S. æstivalis*, FISCHER, Sitka, Unalashka, Kotzebue Sound, (all the Aleutian Islands. T.)

S. arguta, DONN. Northwest coast. Where?

S. nudicaulis, DONN. between Norton and Kotzebue Sound, *fide* Ledebour, Flora Rossica.

S. heteranthera, HOOKER. *S. mertensiana*, BONG., Veg. Sitka, *fide* Ledebour, *S. æstivalis*, var. T. and G. Sitka.

S. exilis, STEPH., Schischmareff and Eschscholtz Bays. Most likely as suggested by J. D. Hooker, only a weedy state of *S. cernua*.

S. sibirica, L., Kotzebue Sound.

S. rivularis, L., Kotzebue Sound.

S. cæspitosa, L., Kotzebue Sound.

S. exarata, VILL., Unalashka, Kotzebue Sound.

S. sileniflora, STERNB., Kotzebue Sound, Unalashka. (Common on all the Aleutian Islands. T.)

S. androsacea, L., Is hardly likely to be identical with the plant said by Pursh to inhabit the northwest coast; Dr. Rothrock does not include it in his list.

Boykinia richardsonii, *Saxifraga richardsonii*, HOOK., *S. nelsoniana*, HOOK. and ARNOTT, in Botany of Beechey's Voyage, tab. 29.

Leptarrhena pyrifolia, R. BR., Unalashka and Cape Prince of Wales? (All the Aleutian Islands, growing to a height of 1 foot. Flowers in early July. T.)

Chrysosplenium alternifolium, L., Kotzebue Sound to Cape Lisburne. (Found only on tops of hills in areas bare of other vegetation. Atkha, Attu, Unalashka Islands. T.)

UMBELLIFERÆ.

Bupleurum ranunculoides, L., Port Clarence to Cape Lisburne, Norton Sound. (Obtained only at Saint Michael's. Grows in single stalks on the drier spots of marshy tracts. Flowers bright yellow. Not common. T.)

Ligusticum scoticum, L., Sitka, Kadiak, Kotzebue Sound, and Norton Sound.

Conioselinum fischeri, WIMM. and GRAB., Sitka, Unalashka, Kotzebue Sound, and Arctic coast. (This species occurs throughout the Aleutian Islands, growing on the lowlands. It is regarded as highly poisonous by the natives. T.)

Heracleum lanatum, MICHX. Sitka.

Osmorrhiza nuda, TORR., *O. brevistylus*, BONGARD, Vegetation of Sitka, Unalashka, Sitka.

Archangelica officinalis, HOFFM., Unalashka, Kotzebue Sound, Sitka. (This species occurs sparingly in the vicinity of Saint Michael's, rarely attaining a height of more than 2 feet, and having a stalk scarcely more than half an inch in diameter. Among the Aleutian Islands it is very abundant, especially on the outskirts of the sites of ancient villages and in the excavations which formed the dwellings in those villages. It attains, in such localities, a height of several feet, 4 to 6 feet being common sizes, and of very thick stalks. This species is one of the earliest plants to appear in spring. The leaf-stalks become very long. At Attu I have seen them 4 feet long, bearing a leaf as large as a palm-leaf fan. The tender leaf-stalks and the main stalk are eaten by the Aleuts. During the months of May and June the women go and gather great bundles of these stalks and bring them to the village. The first finger is inserted into the hollow stalk and rapidly split open; the teeth are then used to assist the fingers to separate the tender parts from the exterior skin and strings of the stalk. It is an operation which requires much dexterity and practice to enable one to prevent the tender parts from breaking. The main stalk is stripped of

its skin, which, when young and tender, is easily accomplished. The main stalk possesses a sweetish, aromatic taste; the leaf-stalks are sweeter, but less aromatic. I have seen boys and girls eat these stalks by the yard at a time. A boy at Atkha received the nick-name of Poochka, the Russian name of this plant, because he devoured so much of it. On the approach of frost the plant rapidly withers, and leaves the dry stalks standing until pushed out of the way for the next year's growth. When these stalks are in sufficient quantity near a village the people use them as fuel. The exterior bark of the dead stalk is impervious to the rain; hence when camping out a fire is easily started with these stalks if they are first broken open. They produce a fierce fire. T.)

A. gmelini, D C., Sitka, Unalashka, Kotzebue Sound.

ARALIACEÆ.

Panax horridum, SMITH. Sitka, Kadiak.

Adoxa moschatellina, L., Russian America, *fide* Ledebour; what part?

CORNACEÆ.

Cornus suecica, L., Common on western coast of Alaska. (Common at Saint Michael's. Flowers in the latter part of June. Grows in small patches along edges of grassy bluffs. T.)

C. unalaschkensis, LEDEBOUR. Unalashka.

C. canadensis, L., Sitka. (Abundant at Saint Michael's. Fruit bright red, edible, sweetish taste. Plentiful among the Aleutian Islands. T.)

C. stolonifera, MICHX., Fort Yukon.

CAPRIFOLIACEÆ.

Sambucus pubens, MICHX., Sitka.

Viburnum acerifolium, L., Fort Yukon.

V. pauciflorum, PYLAIE, *V. acerifolium*, Bongard's Veg. Sitka. (The stipuliform appendages appear to be the only constant difference between these two species in my specimens. They are quite variable in length of stamens and shape of corolla.—J. T. Rothrock.)

Linnæa borealis, GRONOV., Norton and Kotzebue Sounds, Sitka, Unalashka. (Abundant throughout the Aleutian Islands. Grows on the cold hillsides. Flowers pink. T.)

RUBIACEÆ.

Galium trifidum, L., Unalashka and Sitka.

G. boreale, L., *G. rubivides*, HOOK. and ARNOTT, Bot. Beechey, *fide* Seemann. Kotzebue Sound, Buckland River, Fort Yukon, and banks of Yukon River.

G. triflorum, MICHX., Sitka, Unalashka.

G. aparine, L., Sitka, Unalashka. (Found only at Attu Island, growing under the eaves of an old house. Flowers greenish white. The plant consisted of only a single stalk and was certainly an introduced individual. T.)

VALERIANACEÆ.

Valeriana dioica, L., Norton Sound.

V. capitata, WILLD., Kotzebue Sound to Cape Lisburne, Sitka, Point Barrow to Mackenzie River, and south to Aliaska.

Tellima grandiflora, DOUGL, Sitka and islands adjacent to the coast.

Tiarella trifoliata, L., Sitka and Alaskan coast.

Heuchera glabra, WILLD., *H. divaricata*, FISCH., Sitka.

COMPOSITÆ.

Nardosmia frigida, HOOK., includes *N. corymbosa*, HOOK.; Unalashka, Norton Sound, northern coast.

Aster multiflorus, AIT., (Perhaps we may include under this *A. ramulosis*, LINDL., and *A. falcatus*, LINDL. If this be done we have one polymorphic species ranging from Georgia to Point Barrow and Mackenzie River, and from Massachusetts to the Rocky Mountains.) Northern coast.

A. peregrinus, PURSH. Unalashka, Norfolk Sound. (Abundant throughout the Aleutian Islands. Usually solitary stalks. On some of the islands this plant blooms until covered with snow in the middle of November. Where the roots have been covered by heavy snow-drifts at elevations of 1,500 feet it is the last plant to flower in spring; the colors of which vary from lightest pink to blueish. T.)

A. foliaceus, LINDL., Unalashka.

A. salsuginosus, RICHARDS., Sitka, Unalashka, Kotzebue Sound.

A. alpinus, L., Unalashka, 2,000 feet above sea-level.

A. sibiricus, L., including, after J. D. Hooker and Fries, *A. montanus*, RICHARDS, and *A. richardsonii*, SPR. Kotzebue Sound, Unalashka, Point Barrow.

Erigeron uniflorum, L., (Following Fries, I include under this species *E. pulchellum*, D C., as a variety. There is unquestionably good ground for the union.—J. T. Rothrock.) Unalashka, Cape Lisburne.

E. glabellum, NUTT., Wainwright Inlet to Mackenzie River; var. *asperum*, Fort Yukon.

Solidago virga-aurea, L., Unalashka to Kotzebue Sound Cape Lisburne, and on northern coast; var. *multiradiata*, Fort Yukon.

S. confertiflora, D C., Unalashka, Cape Mulgrave, Kadiak.

Ptarmica borealis, D C., Sitka.

P. sibirica. Unalashka, Eschscholtz Bay.

P. speciosa, D C., given by Ledebour, on the authority of J. G. Gmelin, as a native of this region.

Achillea millefolium, L., Norton Sound, Unalashka, Sitka, Fort Yukon.

Leucanthemum integrifolium, D C., Kotzebue Sound; Saint Lawrence Island, and from Point Barrow to Mackenzie River.

L. arcticum, D C., Norton Sound to Washington Inlet. (Abundant at Saint Michael's and throughout the Aleutian Islands; growing along the beach in solitary stalks, with roots much exposed. The leaves of this plant at Saint Michael's are very fleshy. T.)

Matricaria discoidea, D C., Sitka, Unalashka.

M. inodorata, L., Kotzebue Sound, var. *eligulata*, Norton Sound. This may be yet entitled to specific rank, as Seemann suggests.

Tanacetum kotzebuensis, BESS., Cape Espenberg, *fide* Ledebour ex Eschscholtz.

T. huronense, NUTT., Fort Yukon.

Artemesia borealis, PALLAS. Kotzebue Sound, Arctic coast, and what seems to be a variety with glomerate, almost capitate, inflorescence from Sitka.

A. vulgaris, L., var. *tilesii*, Fort Saint Michael's and western and northern coasts.

A. glomerata, LEDEB.? Kotzebue Sound.

A. androsacea, SEEM., Bot. Herald, tab. 6; *A. glomerata* of Hooker and Arnott, Bot. Beechey, but not of Ledebour, *fide* Seemann. This, it is thought by Dr. Hooker, may prove "an arctic, tufted variety of some better-known plant."

A. globularia, CHAM., Unalashka, Saint Lawrence.

A. arctica, LESS., Cape Lisburne and Point Hope, and possibly Sitka.

A. chamissonis, BESS., Seemann states that though *A. arctica* and *A. chamissonis* are by some authors united, they may be at once distinguished by their different habits.

A. absinthium, L., Given by Ledebour (Flora Rossica), on the authority of J. G. Gmelin, as a doubtful native of Russian America.

Gnaphalium sylvaticum, L., Russian America, *fide* Ledebour ex J. G. Gmelin.

Antennaria alpina, GAERT., including *A. monocephala*, D C. Kotzebue Sound, Saint Lawrence Island and Unalashka. (Common throughout the Aleutian Islands, growing in stools among the clefts of rocks on the sides of the drier ravines. T.)

A. dioica, GAERT., Islands adjacent to the American coast, Ledebour ex J. G. Gmelin. (Common throughout the Aleutian Islands; grows in the clefts of the drier rocks on the faces of bluffs. T.)

A. margaritacea, R. BR., Sitka, Unalashka. (Abundant throughout the Aleutian Islands, growing on the drier hillsides. Rare at Saint Michael's. T.)

Arnica angustifolia, VAHL. Kotzebue Sound, Fort Yukon.

A. chamissonis, LESS., Unalashka.

A. obtusifolia, LESS., Unalashka.

A. unalaschkensis, LESS., Unalashka. (Common everywhere on the Aleutian Islands, growing on the drier hillsides. T.)

A. latifolia, BONG., Sitka.

Senicio resedifolius, LESS., Cape Lisburne, Kotzebue Sound. (Common throughout the Aleutian Islands, growing on hillsides. Flowers yellow. T.)

S. frigidus, LESS., Kotzebue Sound, Cape Lisburne, Saint Lawrence.

S. triangularis, HOOKER. Sitka.

S. pseudo-arnica, LESS., Common on western shore of Alaska; also Chamisso Island.

S. aureus, L., Fort Yukon.

S. lugens, RICHARDS., Kotzebue Sound, Cape of Good Hope, Fort Yukon.

S. palustris, D C., Norton Sound, Kotzebue Sound, Wainwright Inlet, northern shore. (Obtained only at Saint Michael's, growing on wet situations, 2 to 3 feet high high. Not common. T.)

S. hookeri, T. and G., Kotzebue Sound.

Saussurea alpina, L., Kotzebue Sound. Dr. Rothrock here includes *S. monticola*, which was found by Pullen on the northern shore from Point Barrow to Mackenzie River.

S. subsinuata, LEDEB., Kotzebue Sound, Bot. Herald, tab. 7.

Taraxacum dens-leonis, DESF., Kotzebue Sound to Point Hope and northern coast. Unalashka, var. *ceratophorum*, Norton Sound, (and all the Aleutian Islands. T.)

T. pulustre, D C., Kotzebue Sound. (Common throughout the Aleutian Islands, growing in the dry clefts of rocks on the hillsides and faces of cliffs. The flowers are rich golden-yellow and form of mass of bloom. The leaves are used by the Aleuts, who steam or wilt the leaves and apply them to indolent ulcers. T.)

T. lyratum, D C., Unalashka.

Mulgedium pulchellum, NUTT., Point Barrow to Mackenzie River.

Nabalus alatus, HOOKER. Unalashka, Sitka.

Apargidium boreale, T. and G., Sitka.

Hieraceum triste, WILLD., Unalashka, Norfolk Sound. (Plentiful at Atkha, Attu, and Unalashka. Grows on the wet hillsides. Flowers yellow. At Saint Michael's this plant is quite rare. T.)

(*Cnicus kamtchaticus* (*cirsium*, LEDEB.). This plant (for the first time detected on the North American side) was obtained only at Attu, the westernmost island of the chain. It attains a height of 7 feet and has a remarkably vigorous growth, the stems attaining a diameter of 3 inches and developing a great amount of woody fiber. The leaves are very large, the spines long and sharp, producing a very painful wound. T.)

CAMPANULACEÆ.

Campanula dasyantha, M. and BLEB., Unalashka, Cape Prince of Wales.

C. rotundifolia, L., *C. heterodoxa*, VEST., Sitka.

C. uniflora, L., Kotzebue Sound, Cape Lisburne, Unalashka.

C. lasiocarpa, CHAM., Kotzebue Sound, Unalashka. (Common throughout the entire Aleutian Islands; grows solitary on the hilltops. Rare at Saint Michael's. T.)

(*C. pilosa*, PALL., Abundant at Unalashka; grows on the lower hilltops, which are barren of other vegetation, usually solitary. T.)

ERICACEÆ.

Vaccinium vitis-idæa, L., Unalashka, Saint Lawrence, Sitka, Norton Sound to Point Barrow, and on the northern coast. (This plant is abundant throughout the coast line of the mainland and on the eastern islands of the Aleutian chain. Among the western islands it is not so plentiful and not at all common at Attu. It attains a height of several inches, growing in small patches or else scattered among the other plants of the lower hills. The berries are deep red and intensely acid, but of good flavor after a taste for it is acquired. The natives gather great quanti-

ties of the berries for food, and in some localities are in demand for preservation by putting them in pure water and kept for winter's use by the white people of Alaska. When cooked with a sufficient quantity of sugar they make a good pie or an excellent jelly or jam. T.)

V. myrtilloides, HOOKER. Sitka.

V. myrtillus, L., Sitka.

V. chamissonis, BONG., Sitka, Unalashka.

V. ovalifolium, SMITH. Sitka.

V. parvifolium, SMITH. Sitka.

V. salicinum, CHAM. and SCHLECHT., Unalashka.

V. cæspitosum, MICHX., Sitka.

V. uliginosum, L., Sitka, Unalashka, Kotzebue Sound, northern coast (Plentiful at Unalashka and Attu; less common on the intermediate islands. Berries ripen in latter part of August and early September. They are gathered in great quantities by the natives. T.)

Oxycoccus vulgaris, PURSH. Sitka, Kotzebue Sound, Unalashka.

Arctostaphylos alpina, SPRENG., Unalashka, Norton Sound to Point Barrow, Arctic coast.

A. uva-ursi, SPRENG., Unalashka, Cape Prince of Wales, Arctic coast.

Andromeda polifolia, L., Sitka, Kotzebue Sound. (Common at Saint Michael; rarer among the Aleutian Islands. Grows in little clumps. Flowers purplish. T.)

Cassandra calyculata, DONN. Kotzebue Sound.

Cassiope lycopodioides, DONN. Kotzebue Sound. (Plentiful throughout the Aleutian Islands. Grows in large masses on the low hilltops. Flowers white. Not common at Saint Michael. T.)

C. tetragona, DONN. Saint Lawrence, Kotzebue Sound to Point Barrow, Arctic coast.

C. mertensiana, DONN. Sitka.

C. stelleriana, D C., Sitka.

Phyllodoce pallasiana, DONN. Sitka, Unalashka.

Menziesia ferruginea, SMITH. Sitka, Unalashka.

Loiseleuria procumbens, DESV., Cape Lisburne, Unalashka, Chamisso Island. (Occurs plentifully in small patches throughout the Aleutian Islands. Flowers white. T.)

Rhododendron lapponicum, WAHL., Port Clarence.

R. kamtschaticum, PALL., Unalashka. (Plentiful at Unalashka and Attu; less so at Atkha. Grows along the rocky edges of cliffs. Flowers reddish-purple, quite showy. T.)

Kalmia glauca, AIT., Sitka.

Ledum latifolium, AIT., Sitka.

L. palustre, L., Norton Sound to Point Barrow and northern coast. This and the preceding species should probably be united. (Abundant at Saint Michael's; common at Unalashka, Atkha, and, Attu. A tea is made of the flowers of this plant. The infusion has a slightly terebinthine taste, which becomes pleasant enough after a time. Among some of the white people it has a reputed tonic effect on the system. T.)

Cladothamnus pyrolæflorus, BONG., Sitka.

Pyrola rotundifolia, L., Unalashka, Kotzebue Sound, and northern coast.

Pyrola rotundifolia, L., var. *bractata*, GRAY. (Common throughout the Aleutian Islands, growing in wet places. Flowers greenish. T.)

P. minor, L., Unalashka.

P. secunda, L., Sitka, Kotzebue Sound.

Moneses grandiflora, SALISB., Sitka.

LENTIBULACEÆ.

Pinguicula vulgaris, L., Sitka. (Abundant at Unalashka, rare at Attu and Atkha, growing in wet places bare of other vegetation. The leaves exude a viscid substance which causes many small dipterous insects to adhere to them. Flowers blue. T.)

P. microceras, WILLD., Unalashka.

P. macroceras, CHAM., Unalashka.

P. villosa, L., Islands of Chamisso and Unalashka, Norton Sound.

PRIMULACEÆ.

Primula nivalis, PALL., Unalashka, Saint Lawrence, Kotzebue Sound.

P. stricta, HORNEM., after J. D. Hooker, Dr. Rothrock includes under this species *P. hornemanniana* and *P. mistassinica*, both of C. and S. and of MICHX. Kotzebue Sound.

Androsace chamæjasme, WILLD., Kotzebue Sound to Wainwright Inlet. (Plentiful at Unalashka, rarer at Attu. Grows among the drier rocks on the faces of cliffs. T.)

A. septentrionalis, L., Kotzebue Sound and Chamisso Island, Fort Yukon.

A. villosa is stated by Ledebour to have been found at Kotzebue Sound. It is likely an oversight, as Hooker and Arnott do not contain it in their list of plants collected there.

Dodecatheon meadia, L., Sitka, Kotzebue Sound, and Cape Lisburne. Dr. Rothrock includes in this species *D. integrifolium* and *D. frigidum*, and regards them as varieties of a widely distributed polymorphic species. (Common at Saint Michael, Unalashka, Atkha, and Attu. At Saint Michael's I have known the ground to be covered with a patch of snow on the 1st day of June, which on the 12th had melted, and this plant was then in blossom. At Atkha Island I obtained specimens at an elevation of 1,500 feet, where nothing but scattered stalks of this plant would grow on the barren areas, having little soil mixed with the sharp-edged stones. The plants in such situations were scarcely an inch in height. T.)

Glaux maritima, L., Sitka.

Trientalis europæa, L., Sitka, Norton Sound.

(*T. europæa*, var. *arctica*, GRAY. Grows abundantly in wet places among all the Aleutian Islands. T.)

GENTIANACEÆ.

Gentiana amarella, L., Sitka.

G. acuta, MICHX., Unalaska.

G. tenella, ROLTB., Kotzebue Sound. (Common among the Aleutian Islands, but rare at Saint Michael's. T.)

G. detonsa, FRIES., Point Barrow to Mackenzie River, Fort Yukon.

G. propinqua, RICHARDS., *G. rurickiana*. Kotzebue Sound, Point Clarence, Norton Sound.

G. aleutica, CHAM., Unalashka.

G. prostrata, HÆNKE. Unalashka, Kotzebue Sound. (Common among the Aleutian Islands. Grows in wet situations. T.)

G. glauca, PALL., Kotzebue Sound, Wainwright Inlet.

G. platypetala, GRIESB., Sitka.

G. douglassiana, BONG., Sitka.

Pleurogyne rotata, GRIESB., Kotzebue Sound, Buckland River, Arctic coast. (Rather common among the high grasses on dry hill-sides at Saint Michael. Flowers white. T.)

Swertia perennis, L., Kadiak. Dr. Kellogg also obtained *S. perennis* L., var. *obtusa* from Kadiak.

Villarsia crista-galli, GRIESB., Sitka.

Menyanthes trifoliata, L., Unalashka, Sitka.

POLEMONIACEÆ.

Phlox sibirica, L., Kotzebue Sound.

Polemonium cæruleum, L., Norton Sound to Point Barrow; islands of Saint George, Unalashka, and Chamisso; Fort Yukon. Dr. Rothrock recognizes but two species of this genus belonging to northern North America, the one, *P. reptans*, L., which is well marked, and the other *P. cæruleum*, L., as made up of all the others. The numerous forms of the latter aggregate species are easily connected. Even *P. pulchellum*, Bunge, which is perhaps the best marked variety, shades off by invisible gradations into the others. (Common throughout the Aleutian Islands. Grows to 3 feet in height. Flowers blue. T.)

Diapensia lapponica, L., Saint Lawrence. (Obtained only at Atkha Island among the clefts of rocks on the faces of cliffs. T.)

BORRAGINACEÆ.

Mertensia maritima, DONN. Sitka, Norton Sound to Point Barrow, and Cape Bathurst.

M. paniculata, DONN. *M. pilosa*, D C., Kotzebue Sound, Fort Yukon.

M. sibirica, DONN. *M. denticulata*, DONN, Kotzebue Sound.

Myosotis sylvatica, HOFFM., Cape Lisburne and Arctic coast.

Echinospermum redowskii, LEHM., ? Fort Yukon.

Eritrichium villosum, BUNGE., Dr. Rothrock here includes, after J. D. Hooker, l. c., *E. aretioides*, A. D C., which form is found at Cape Lisburne and island of Saint Lawrence. Tab. III, Bot. Herald.

E. plebejum, ALPH. D C., Unalashka.

HYDROPHYLLACEÆ.

Romanzoffia unalaschkensis, CHAM., Unalashka. (Common on edges and in crevices of cliffs. White flowers. T.)

R. sitchensis, CHAM., Sitka. (Abundant in the clefts on the sides of ravines and faces of bluffs of all the Aleutian Islands. T.)

SCROPHULARIACEÆ.

Pentstemon frutescens, LAMB., Unalashka. Not found since Pallas is said to have discovered it in Kamchatka and in the island of Unalashka.

Mimulus luteus, L., *M. guttatus*, D C. Cape Saint Elias, Unalashka, Kadiak, Sitka. (Very abundant at Unalashka, Atkha, and rare at Attu, growing in the coldest springs of water that issue from the hill-sides. At Atkha this plant is wonderfully abundant, forming large patches, which in the flowering season (early June to the middle of July) are a mass of golden yellow. T.)

Veronica anagallis, L., Sitka. (Common in wet places throughout the entire Aleutian chain. T.)

Veronica americana, SCHWEINITZ. Sitka.

V. beccabunga, L., Unalashka.

V. stelleri, PALL., Unalashka. (Common among the Aleutian Islands. Flowers white. T.)

V. alpina, L., Sitka, Unalashka. Common on the hill-sides throughout the Aleutian Islands. Flowers white. T.)

V. serpyllifolia, L., Sitka, Unalashka. (Common throughout the Aleutian Islands. T.)

Castilleja pallida, KUNTH., Sitka, Kotzebue Sound, Chamisso Island, Arctic coast, Fort Yukon. Dr. Rothrock thinks that J. D. Hooker has justly included with this species *C. septentrionalis*, LINDL. Professor Gray has also united them in the last edition of his Manual of Botany; also, in his revision of the genus (see Am. Jour. Sci., second series, vol. xxxiv, p. 44).

C. parviflora, BONG., Sitka. This is apparently the commonest species and of widest range west of the Rocky Mountains, extending from Russian America to Southern California, Gray, l. c.

(*Euphrasia officinalis*, L., common throughout the Aleutian Islands, growing in wet places. Flowers white or yellow. T.)

Rhinanthus cristi-galli, L., Unalashka. (Throughout the Aleutian Islands, most abundant at Atkha. Growing in wet places. Flowers yellow. Attains a height of 9 inches. T.)

Pedicularis verticillata, L., Sitka and the islands generally; also, Kotzebue Sound. (Common at Saint Michael. Growing in solitary stalks on wet places. Flowers pink to red. T.)

P. chamissonis, STEV., Unalashka. (Common throughout Alaska. Grows in isolated stalks in wet places. The flowers are reddish, and at Saint Michael's is among the first plants to bloom, the flowers appearing before the leaves have grown half an inch in length. T.)

P. pedicillata, BUNGE, *P. nasuta*, BONG., in Veg., Sitka, non—M. A. Bieb., *fide* Ledeb. Fl. Rossica. Sitka.

P. subnuda, BENTH., Sitka.

P. palustris, L., Arctic America. At Bay of Good Hope, *fide* Ledebour in Fl. Ross.

P. euphrasioides, STEPH., Norton Sound, Kotzebue Sound, islands of Chamisso and Kadiak.

P. sudetica, L., Cape Lisburne, Kotzebue Sound, Arctic coast, island of Saint Lawrence. J.

D. Hooker suggests uniting this with *P. langsdorffii*, and Dr. Rothrock, on his authority, admits the reduction. (Common at Atkha, Attu, and Unalashka. At Saint Michael's this plant attains a height of only a few inches. Flowers pink to red. T.)

P. hirsuta, L., including here *P. lanata*, WILLD., as done by Bentham, *fide* J. D. Hooker. Islands of Saint George, Saint Lawrence, Kotzebue Sound, and Arctic coast.

P. versicolor, WAHLENB., Kotzebue Sound, island of Saint Lawrence.

P. capitata, ADAMS., Kotzebue Sound, Arctic coast, Unalashka.

OROBANCHACEÆ.

Boschniakia glabra, C. A. MEYER., Sitka and Kotzebue Sound.

SELAGINACEÆ.

Gymnandra gmelini, CHAM. et SCHLECHT., Unalashka, Saint Lawrence Island.

G. stelleri, CHAM. et SCHLECHT., Kotzebue Sound, island of Saint Lawrence.

LABIATÆ.

Dracocephalum parviflorum, L., Fort Yukon.

Brunella vulgaris, L., Sitka, Unalashka.

Galeopsis tetrahit., Sitka. Probably introduced.

PLUMBAGINACEÆ.

Statice armeria, L., Unalashka, Kotzebue Sound, and northern coast.

PLANTAGINACEÆ.

Plantago major, L., Sitka, banks of Yukon River.

P. macrocarpa, CHAM. et SCHLECHT., Sitka, Unalashka. (Common among the Aleutian Islands; growing in wet situations. Flowers white. T.)

P. maritima, L., Sitka, Unalashka.

P. media, L., Russian America, *fide* J. G. Gmelin.

POLYGONACEÆ.

Oxyria reniformis, HOOK., Sitka, Unalashka, Saint Lawrence, Kotzebue Sound, Cape Lisburne, Arctic coast.

Rumex salicifolius, WEINM., Sitka.

R. acetosa, L., Kotzebue Sound.

R. domesticus, HARTM., Sitka, Unalashka, Kotzebue Sound to Wainwright Inlet.

Polygonum bistorta, L., Kotzebue Sound to Point Barrow and northern coast.

P. viviparum, L., Sitka, Unalashka, along the coast generally.

P. polymorphum, LEDEB., var. *lapathifolium*, LEDEB., Kotzebue Sound. *P. alpinum*, Hook. et Arnott, in Beechey's voyage, *fide* Ledebour. Kotzebue Sound.

P. tripterocarpum, GRAY. This species is not fully proved to be distinct from *P. polymorphum* var. *lapathifolium*, but an additional series of specimens may prove it to be. Coal Bay.

P. aviculare, L., Sitka.

EMPETRACEÆ.

Empetrum nigrum, L., Sitka, Saint Lawrence, Unalashka, Norton Sound, Point Barrow, Arctic coast. (This heather is found abundantly throughout all the treeless portions of Alaska. On the Aleutian Islands it obtains its maximum growth. The lower hills are covered with large patches of many rods in area with this species. The berries are black in color, have a slightly acid taste when ripe, being produced in profusion on the stems, so much so that nearly a handful may be gathered at a time. Great quantities are gathered by the natives, who use them either raw or else cooked, though rarely in the latter manner. These berries form the food of several species of birds, such as geese, ptarmigans, and plovers. The natives of Alaska and some of the eastern

islands of the Aleutian chain use this heather for fuel. The women gather great bunches by pulling it from the ground and carrying it to their houses, where it is immediately used. In rare instances it is kept for a few days (but only because there is a sufficiency of other fuel to be used in its stead), until it is dried out. It is used in the following manner: The pot or kettle containing water or food to be boiled is placed on a small stick stuck in the side of the sod chimney of the hut; a few shreds of the plant are lighted, it burns rapidly, and has a quick, darting flame, like the branches of pine trees. The bunch of lighted fuel is held under the vessel, and, as fast as it is consumed by flame another wisp is lighted, until the boiling is finished. This work is usually performed by the smaller boys or girls. This kind of fuel is not used by the Attu people, the Atkan people being the farthest to the west who employ it for that purpose. The Attu people have never used it, and only those of Attu who have been to the eastward know how to use it, as it requires considerable skill to keep the heat properly applied to the vessel containing the water or food.

At Atkha Island I saw several large patches, which had a deeper green and seemed to be of more vigorous growth. On inquiry I found that the people had in few years past taken the heather off from those areas, and that it was being renewed with a heavier growth. T.)

(*Bryanthus aleuticus*, GRAY. Common on the high hill-tops of the Aleutian Islands. Flowers white. T.)

SALICACEÆ.

Salix myrtilloides, L., Kotzebue Sound.

S. lapponicum, L., Kotzebue Sound.

S. glauca, L., Cape Espenberg and Chamisso Island.

S. arctica, PALL., Unalashka, Kotzebue Sound.

S. myrsinites, L., Saint Lawrence Island *fide* Ledebour.

S. ovalifolia, TRAUTVELT.; *S. uva-ursi*, Seemann, Bot. Herald (*fide* Anderson). Kotzebue Sound, Cape Espenberg, Unalashka.

S. rhamnifolia (PALL.?). Unalashka.

S. glacialis, ANDERS., Between Cape Barrow and Mackenzie River, "Captain Pullen."

S. reticulata, L., Unalashka, Kotzebue Sound, Cape Lisburne, Arctic coast.

S. phlebophylla, ANDERS., Unalashka, Saint Lawrence, Kotzebue Sound.

S. polaris, WAHL., Wainwright Inlet.

S. speciosa, HOOK. et ARNOTT, in Bot. Beechey. Kotzebue Sound.

S. richardsoni, HOOK., Kotzebue Sound to Cape Lisburne.

(*S. rotundifolia*, TRAUTVELT, var. *retusa* (?). This species of willow was collected at Atkha Island, where it is common, growing among the heather (*Empetrum nigrum*), with its heads of cottony catkins peering just above the surface of the other vegetation. I did not observe this species on any other island, though it doubtless occurs. T.)

S. barclayi, ANDERS., Kadiak.

S. phyllicoides, ANDERS., Western Arctic America (Avatscha Bay, Seemann).

S. cordata, MUHL., var. *mackenziana*. Point Barrow and along Arctic coast. This form Anderson regards as a hybrid between *S. cordata* and *S. vagans*.

(*Salix pallasii*, ANDERS., var. *obcordata*, ANDERS., This species of willow attains the greatest size of any among the Aleutian Islands. The growth is exceedingly crooked, rarely straight for more than a foot, attaining a diameter of 2 to 3 inches, but often decayed within. In all the valleys and wider ravines this species is found in abundance. The roots form an intricate mass, often much exposed, and, with the crooked branches and trunks, form an impenetrable thicket of considerable area. When drift-wood is scarce the Aleuts grub up these shrubs (for they are not fit to be termed even an approach to trees), to be used as firewood. When the wood is well seasoned it produces a bright hot fire, making a much better heat than any of the drift-wood which is cast upon the beach. Vemaminof states that in former years the willows grew to such size in one of the ravines opening on the west side of Captain's Harbor at Unalashka Island that the Russians and Aleuts procured sufficient of these trunks to be used advantageously in making *bidaras* (open skin boats), and *bidarkas* (skin-covered canoes). I visited the locality to find traces of such former growth and found

the willows to be of but little better size than in other places near by. It is a fact that on the tops and high sides of some of the hills just beyond the present graveyard at Iliuliuk are to be found at the present day large roots of the willow exposed to the air and but little decayed. At those heights the willows do not at present grow, and no species of willow is now found growing near them. Those roots are of equal size of any that now grow in the ravines many hundred feet feet below. I may add that I have heard visitors to those places make the assertion that those roots are the roots of oaks. T.)

S. sitchensis, LEDEB., Sitka.

Populus balsamifera, L., Chilcaht, Yukon River.

URTICACEÆ.

Urtica dioica, L., Sitka, *fide* Bongard.

BETULACEÆ.

Betula glandulosa, MICHX., Yukon River.

B. nana, L., Norton Sound, Chamisso Island, Point Barrow.

B. ermani, CHAM., Unalashka.

Alnus viridis, D C., Sitka, Unalashka, Norton Sound, Kotzebue Sound, Yukon River, Northern coast.

A. rubra, BONG., Sitka.

A. incana, WILLD., Kotzebue Sound.

MYRICACEÆ.

Myrica gale, L., Sitka.

CONIFERÆ.

Abies canadensis, MICHX., Sitka.

A. mertensiana, BONG., Sitka.

A. sitchensis, BONG., Sitka.

A. alba, MICHX., Northwestern Alaska, where, according to Seemann, it grows from 20 to 25 feet high.

Pinus cembra, L., Kotzebue Sound, *vide* Bongard and Hooker and Arnott.

P. contorta, DOUGL., Sitka. Dr. Rothrock thinks this can hardly be *P. inops* of Ait., as is alleged by some authors.

Thuja excelsa, BONG., Sitka and Southern Russian America.

Juniperus nana, WILLD., Sitka.

SALSOLACEÆ.

Teloxys aristata, MOQUIN-TANDON. Russian America. (Where?)

Atriplex littoralis, L., Kotzebue and Norton Sound.

A. gmelini, C. A. MEYER, BONG., Veg. Sitka. Kotzebue Sound, Sitka.

Corispermum hyssopifolium, STER., Point Barrow to Mackenzie River.

Blitum capitatum, L., Fort Yukon.

TYPHACEÆ.

Sparganium natans, L., Kotzebue Sound, Unalashka.

AROIDEÆ.

Lysichiton kamtschatcense, SCHOTT; *Draconticum kamtchatcene*, L.; *Symplocarpus kamtschaticus*, BONGARD; *Arctiodracon kamtschaticum*, Gray on the botany of Japan in Memoirs of American Academy of Arts and Sciences, new series, vol. 2, pp. 408, 409. Sitka. Dr. Rothrock gives the description and some remarks on the affinities of this plant, by Professor Gray, l. c.

NAIDACEÆ.

Zostera marina, L., Unalashka.
Potamogeton natans, L., Sitka.
P. rufescens, BESSER., Unalashaka.

JUNCAGINACEÆ.

Triglochin maritimum, L., Sitka.
T. palustre, L., Unalashka.

ORCHIDACEÆ.

Corallorhiza mertensiana, LINDL., Sitka.
C. innata, R. BR., Kotzebue Sound, Unalashka.
Microstylis diphyllos, LINDL., Unalashka.
Calypso borealis, SALISB., Sitka.
Orchis latifolia, L., Unalshka.
Platanthera obtusata, LINDL., Kotzebue Sound.
P. schischmareffiana, LINDL., Unalashka.
P. Koenigii, LINDL., Sitka, Unalashka.
P. dilatata, LINDL., Sitka, Unalashka.
Peristylus chorisianus, LINDL., Unalashka.
P. bracteatus, LINDL., Unalashka.
Listera cordata, R. BR., Sitka, Unalashka.
L. eschscholtziana, CHAM., Unalshka.
Spiranthes romanzoffiana, CHAM., Unalashka.
Cypripedium guttatum, SWARTZ, Unalashka. (Abundant on the drier hill-sides at Unalashka; common on the higher parts of the valleys at Attu; not found on the intermediate islands. Flowers greenish-white, with dots of brown or rusty color. T.)

IRIDACEÆ.

Sisyrinchium bermudiana, L., var. *anceps*. Sitka.
Iris sibirica, L., Norton and Kotzebue Sounds. (A species of *Iris* is quite plentiful on all the Aleutian Islands. I am not aware to which species it should be referred. T.)

SMILACEÆ.

Streptopus amplexifolius, D C. Sitka and Unlalashka. (Rare at Saint Michael's. Among the Aleutian Islands it grows along the deeper ravines, among the rank vegetation, attaining a height of over three feet. T.)
S. roseus, MICHX., Sitka.
Smilacina bifolia, KER., Sitka. Dr. Rothrock adds: "The large-leaved form appears most common by far, if we may judge from the proportion of it in the collections made at Sitka."
(*Smilacina liplia*, var. *occidentalis*. This insignificant plant was obtained only at Attu Island. It is quite rare, growing on the level wet tops of the lower hills. T.)
(*Uvularia amplexifolia*, L., Throughout the mainland coast south of the Bering Strait; very plentiful on all the Aleutian Islands; grows along the bases of ravines and among other rank vegetation. Fruit bright red, edible; flowers greenish. T.)
(*Maianthemum bifolium*, D C. Not common; throughout the Aleutian Islands. T.)

LILIACEÆ.

Lloydia serotina, RICHENB., Saint Lawrence Island, Unalashka, Cape Lisburne, Kotzebue Sound. (Grows in clusters on ledges of highest bluffs. Flowers white; obtained only at Unalashka; not observed elsewhere. T.)
Fritillaria kamtschatcensis, FISCH., Sitka, Unalashka, Cape Prince of Wales. (Common at Saint Michael's, there attaining a height of only a few inches, with bulb proportionately small.

The flower being small and of more greenish color. The natives of Norton Sound eat the bulb, but not to such a degree as the natives of the Aleutian Islands, where this plant is found in greatest abundance and size on all the islands. The natives (Aleuts) consume great quantities of the bulbs. During the months of September and August the women accompany the men who go out hunting the geese, which are making their autumnal migration. The women dig the roots of this lily and store them in huge grass sacks for winter's use. The bulbs are dug up with a copper or iron rod, the dirt shaken off and exposed to the air to dry the remaining dirt, which is then removed as much as possible. The bulbs are boiled with meat or simply in water; either way reduces them to a pasty consistency, having about as much taste as so much boiled starch. When eaten raw the bulblets have a bitter taste (the bitterness lies only in the thin skin which surrounds them), and is at first difficult to acquire a taste for. Those plants which grow in rich, loose soil form a bulb which is often 2 inches in diameter and an inch in thickness. This proves that by cultivation these bulbs could be produced of such size that they might be used as a substitute for the watery potatoes which are grown on some of the islands. The Russian-speaking people call this plant *sa ra ná*, meaning lily. T.)

Allium schœnoprasum, L., Port Clarence, Norton and Kotzebue Sounds, and rapids of Yukon River. (A species of garlic occurs plentifully at Attu on the south side of the island. The natives dig it in the latter part of August, and use the bulbs for seasoning geese and other water-fowl. It is very strong, and when once eaten of is never forgotten. It does not, to my knowledge, occur on the eastern islands of the Aleutian chain. T.)

Zygadenus glaucus, NUTT., Kotzebue Sound, Port Clarence, Arctic coast, Fort Yukon.

Veratrum eschscholtzii, GRAY. Sitka.

Tofieldia coccinea, RICHARDS., Kotzebue Sound, Chamisso Island, Cape Lisburne.

T. glutinosa, PURSH. Sitka.

T. borealis, L., abundant throughout the Aleutian Islands, growing along the little streams which issue sluggishly from the ground. (T.)

JUNCACEÆ.

Luzula pilosa, WILLD., Sitka, Kotzebue Sound.

(*L. comosa* var. *congesta*. Common throughout the western Aleutian Islands. T.)

L. spadicea, D C. Sitka, Unalashka, Kotzebue Sound.

(*L. spadicea*, D C., var. *parviflora*, MEYER. Common throughout the western islands of the Aleutian Chain. T.)

L. arcuata, WAHL., Kotzebue Sound, Saint Lawrence, Unalashka.

L. campestris, D C., Unalashka, Sitka, Kotzebue Sound.

L. spicata, D C., Saint Lawrence, Kotzebue Sound.

Juncus balticus, DETHARD. Cape Espenberg, Norton Sound, Unalashka.

J. arcticus, WILLD., Sitka.

J. ensifolius, WICKSTRÖM. Unalashka.

(*J. xiphioides* var. *triandrus*, ENG., Common at Atkha and Attu. T.)

J. falcatus, E. MEYER. Unalashka, Sitka.

J. castaneus, SMITH. Sitka, Unalashka, Kotzebue Sound. (Common throughout the Aleutian Islands. T.)

J. biglumis, L., Kotzebue Sound.

J. drummondi, LEDEB., Unalashka (to Attu. T.)

J. paradoxus, MEYER. is given by Ledebour as a doubtful native of Sitka.

CYPERACEÆ.

Scirpus cæspitosus, L., Unalashka, Sitka.

S. sylvaticus, L., Sitka.

Eriophorum vaginatum, L., Sitka.

E. scheuchzeri, HOPPE. Kotzebue Sound and Sitka, *fide* Mertens.

E. chamissonis, C. A. MEYER. Sitka, Unalashka. (Abundant on the boggy places throughout the Aleutian Islands. T.)

E. callitrix, CHAM., Saint Lawrence.

E. latifolium, L., Including *E. polystachyum* and *E. gracile*, Sitka, Norton Sound to Point Barrow and the Arctic coast. "The silky hair of the cotton grasses is used by the Esquimaux as a substitute for tinder," Seemann. (Not uncommon on the Aleutian Islands. T.)

(*E. capitatum*, HOST., Rather common at Saint Michael's. T.)

Rhynchospora alba, VAHL., Sitka.

Elyna spicata, SCHRAD., Arctic coast.

Carex leiocarpa, C. A. MEYER. Sitka, Unalashka.

C. micropoda, C. A. MEYER. Unalashka.

C. circinata, C. A. MEYER. Sitka, Unalashka.

C. nigricans, C. A. MEYER. Sitka, Unalashka.

C. pauciflora, LIGHTF., Sitka.

C. elongata, L., Sitka.

C. leporina, L., Unalashka.

C. lagopina, WAHL., Kotzebue Sound.

C. norvegica, WILLD., Sitka, Kotzebue Sound.

C. canescens, L., Sitka.

C. stellulata, GOOD., Sitka, Unalashka.

C. remota, L., Sitka.

C. buxbaumii, WAHL., Sitka, (Saint Michael's. T.)

C. mertensii, PRESCOTT. Unalashka, Sitka.

C. atrata, L., Kotzebue Sound.

C. gmelini, HOOK., Sitka, Unalashka, Kotzebue Sound.

C. livida, WAHL., Sitka.

C. capillaris, L., Unalashka.

C. rariflora, SMITH. Unalashka, Schischmareff Bay.

C. rotundata, WAHL., Kotzebue Sound.

C. macrochæta, C. A. MEYER. Unalashka, Sitka.

C. melanocarpa, CHAM., Saint Lawrence.

C. stylosa, C. A. MEYER. Sitka, Unalashka.

C. limosa, L., Sitka.

C. saxatilis, WAHL., Kotzebue and Norton Sounds.

C. cæspitosa, L., Sitka, Kotzebue Sound.

C. stricta, GOOD., Kotzebue Sound.

C. aquatilis, WAHL., Unalashka, Kotzebue Sound.

C. cryptocarpa, C. A. MEYER. Sitka, Kotzebue Sound. (All the Aleutian Islands. T.)

C. acuta, L., Sitka.

C. vesicaria, L., Sitka, Kotzebue Sound.

C. fuliginosa, STERNB., Kotzebue and Norton Sounds. In a foot-note Dr. Rothrock states that he had not access to Boott's great work on Carex, and has followed Ledebour as the latest available authority. Most likely some modifications of this list will yet be needed.

GRAMINEÆ.

Hordeum pratense, L., Sitka, Unalashka.

H. jubatum, L., Fort Yukon, Saint Michael's.

Elymus sibiricus, L., Sitka.

E. arenarius, L., Norton Sound to Point Barrow.

E. mollis, TRIN., Sitka, Norton and Kotzebue Sounds. (Abundant throughout the Aleutian Islands. Grows to a height of five feet in favorable situations. The grains have a tendency to produce ergot. It is rare to find a head without one or more diseased grains of often an inch in length. T.)

Triticum repens, L., Kotzebue Sound.

Festuca ovina, L., Kotzebue Sound.

F. rubra, L., Sitka, Kotzebue Sound. United by Messrs. Hooker and Gray with *F. ovina*.

F. subulata, BONG., Sitka.

Bromus ciliatus, L., Kotzebue Sound.

B. subulatus, LEDEB., Unalashka.

B. aleutensis, TRIN., Unalashka.

B. sitchensis, BONG., Sitka.

Poa stenantha, TRIN., Unalashka, Sitka, and in America Arctica and Fretum Senjawin, Ledebour Flora Rossica, vol. iv, p. 372. (In a foot-note Dr. Rothrock adds that on the authority of Prof. S. F. Baird the fretum Senjawin is on the Asiatic side, and lies in latitude 64° 45′ north and longitude 172° 35′ west, between Kayne Island and the Asiatic shore.)

P. flavicans, LEDEB., Unalashka.

P. arctica, R. BR., Kotzebue Sound, Unalashka, Sitka.

P. cenisia, ALL., Unalashka, Cape Lisburne, Kotzebue Sound. Dr. Rothrock here includes *P. abbreviata*, BR.

P. rotunda, TRIN., Unalashka.

P. nemoralis, L., Kotzebue Sound.

P. annua, L., Sitka.

P. pratensis, L., Kotzebue Sound, Unalashka.

Colpodium fulvum, LEDEB., Kotzebue Sound.

Dupontia psiloantha, RUPR., Kotzebue Sound.

Catabrosa aquatica, BEAUV., Sitka, *fide* Ledebour.

C. algida, FRIES. Kotzebue Sound.

Atropis maritima, LEDEB., Sitka.

A. angustata, LEDEB., Kotzebue Sound.

Glyceria aquatica, SMITH. Sitka.

G. glumaris, LEDEB., St. Lawrence, Sitka, Aliaska, Kotzebue Sound.

G. angustata, PRESL., Atkha Island.

G. stenantha var. *vivipera*. Atkha Island.

Hierochloa borealis, R. and SCHULT., Unalashka, Kotzebue Sound.

H. alpina, R. and SCHULT., Unalashka, Kotzebue Sound, Arctic Sound.

Trisetum subspicatum, TRIN., Unalashka, Kotzebue Sound, Point Barrow to Mackenzie River.

T. sesquiflorum, TRIN., Unalashka.

T. cernuium, TRIN., Sitka.

Aira cæspitosa, TRIN., Unalashka and mainland.

A. cæspitosa, TRIN., var. *bottnica*. Sitka. (Dr. Rothrock adds that, in looking over the specimens of *A. cæspitosa* in Herb. Gray, he finds one from the Sandwich Islands, and another from Fort Vancouver, both of which appear identical with our forms from Sitka. They having been authentically named by Colonel Munro as *Aira cæspitosa* var. *bottnica*, he has labeled the Sitkan specimens in accordance with his determination. Trinius, in Icones Granimum, in the text fronting his *A. flexuosa*, var. *bottnica*, speaks of an Aira very similar to *A. bottnica* being found at Sitka by Mertens. Bongard is silent on the subject in "Vegetation of Sitka," though he finds in Herb., Gray, a specimen similar to the Sitkan ones marked (but from Unalashka) as *A. cæspitosa*, var. *longiflora*. Trinius l. c., Vol. III, writes of the same plant from Sitka, "Cæterum hac varietate transitus quidam sistitur ab *A. cæspitosa* ad flexuosam"; which statement seems probable enough.)

A. arctica, TRIN., Kotzebue Sound, Unalashka, Sitka, and interior of the country.

A. atropuspurea, SCHEELE. Sitka, Unalashka, and from Point Barrow to Mackenzie River.

Calamagrostis aleutica, TRIN., Unalashka, Sitka.

C. purpurasceus, R. BR., Fort Yukon. Torrey and Gray regard this as a form of *C. sylvatica* D. C.

C. strigosa, WAHL., Sitka. Munro unites this with *C. aleutica*, BONG.

C. neglecta, GAERTNER. Kotzebue Sound.

C. lapponica, TRIN., Unalashka.

C. canadensis, BEAUV., Kotzebue Sound.

C. langsdorffii, TRIN., Kotzebue Sound.

Arctagrostis latifolia, LEDEB., Kotzebue Sound and Arctic coast.
Cinna latifolia, LEDEB., Sitka.
Agrostis æquivalvis, TRIN., Sitka, Unalashka.
A. exarata, TRIN., Unalashka, Sitka, Kadiak.
A. geminata, TRIN., Unalashka.
A. laxiflora, R. BR., Unalashka.
Phleum pratense, L., Alaska, where it thrives well according to Kellogg; but in what part of Alaska?
P. alpinum, L., Sitka, Unalashka, Kotzebue Sound, Saint Lawrence (Arctic coast?).
Alopecurus alpinus, SM., Saint Lawrence, Kotzebue Sound (and Arctic coast?).

EQUISETACEÆ.

Equisetum arvense, L., Sitka, Unalashka.
E. sylvaticum, L., Kotzebue Sound.

LYCOPODIACEÆ.

Lycopodium selago, L., Sitka, Unalashka, Kotzebue Sound. (Throughout the Aleutian Islands, grows in stout clumps. T.)
L. annotinum, L., Sitka, Unalashka, Kotzebue Sound, Norton Sound.
L. sitchense, RUPRECHT. Sitka.
L. complanatum. Sitka, *fide* Ledebour, Flora Rossica. (Abundant at Unalashka, and common on the western islands of the Aleutian Chain. Grows amongst the scanty grasses on the dryer hill-tops. T.)
L. alpinum, L., Unalashka. Found in abundance throughout the treeless districts of Alaska.
L. dendroideum, MICHX., Sitka; *fide* Ledebour, Flora Rossica.
L. clavatum, L. Sitka, Unalashka. (Common at Saint Michael's and the Aleutian Islands, growing at times twenty feet long. T.)
Selaginella spinosa, BEAUV., Unalashka.

FILICES.

Ophioglossum vulgatum, L., (obtained only at Unalashka, where it grows in great abundance among the rankest patches of other ferns and weeds. The leaf is bright sap green during life, and turns golden yellow as it withers. This species was carefully sought for among the other islands, but not discovered. T.)
Botrychium lunaria, L., Unalashka. (Abundant at Unalashka and Attu. Not observed elsewhere, though carefully searched for. This fern grows on the edges of the rocks which have been covered with a light or thin deposit of soil. The number of plants found at any given locality, though of very restricted area, may be as great as fifty, and varying from 1 to 6 inches in height. At Attu they were found on the gravelly level at the head of Chichagof Harbor, among the scanty grasses just a few rods west of where are the remains of the former houses of the natives who were taken to the Commander Islands. At Sarana Bay, on the northeast side of Attu, this fern grows in great profusion and attains a height of 9 inches in the rich, warm, sandy soil which is at the head of that bay, among the rank grasses of that place, near the present houses which constitute the summer village of the Attu people. T.)
(*B. boreale*, MILDE. This species was not observed elsewhere than on the sides of the paths beyond the graveyard at Iliuliuk village, Unalashka. It never grows in patches. Rarely more than one stalk will be found at a time or separated by at least a few inches from another, and not more than half a dozen will be found near the first. It attains a variable size of half an inch to 4 inches in height, depending altogether on the, soil, for in those places where the banks, or sides of the cow-paths have parted, and fresh soil has been exposed several years before will be found the larger plants of this species. T.)
(*B. lanceolatum*, AUGST., Common at Unalashka, growing isolated among the scanty grasses and mosses of the low hill-tops and along the broken edges of the paths leading beyond the lake southeast of Iliuliuk village. T.)

(*B. rutaceum*, WILLD., (*B. matricarifolium*, A. BROWN. Unalashka. T.)

(*B. ternatum*, SCHWARTZ. Common at Unalashka, growing on the lower level grounds and at the bases of gradually sloping hills. This species remains green throughout the winter, the last frond alone remaining so, and toward spring turns a dull bronzy color, which disappears with the enlivenment of spring. This species was not observed to the westward. T.)

(*B. virginicum*, SCHWARTZ. Very rare at Unalashka; not observed on any of the other Aleutian Islands. T.)

Cystopteris fragilis, BERNH., Unalashka, Kotzebue Sound. (I found this species to be rare at St. Michael's, of scanty growth in small clusters. At Unalashka it occurs in the small caves along the beach. At Svenoi or Hog Island, in Captain's Harbor, it is very plentiful. In a cave at the head of Goltseb Harbor, on the northern side of Attu Island, it is very abundant, growing in large patches and of luxuriant growth. It does not occur on the intermediate islands that I am aware of. T.)

(*Aspidium oreopteris*, SWARTZ. Common at Unalashka and Attu. Not found on the intermediate islands. Not previously described from North America. T.)

(*A. spinulosum* var. *dilatatum*, HOOKER. Obtained at Unalashka, Afognak, and Attu. Quite common at the latter place; grows in tufts of a half dozen fronds from a single root. The plant has a yellowish-green color in life, and is conspicuous among other plants at the bases of bluffs and the sloping sides of the wide ravines. T.)

A. lonchitis, SWARTZ, Unalashka, Chamisso, and Eschscholtz. (A single tuft, of half a dozen fronds, was brought to me by a native at Saint Michael's. It is quite rare there. At Unalashka it is extremely abundant, growing on the ledges of cliffs and bluffs which form the steep sides of the deeper ravines. This species was never met with far from the sea-shore, and was not observed on the islands to the westward. T.)

A. fragrans, SWARTZ. Sitka, Unalashka.

A. aculeatum, SWARTZ. Sitka. (Prof. D. C. Eaton says this species has been found but once at that locality. T.)

Blechnum spicant, ROTH., (*Lomaria spicant*, DESV.), Sitka.

Pteris aquilina, L., Sitka.

P. argentea, S. G. GMELIN. America-Rossica, Steller ex Pallas. (An evident error. T.)

Allosorus sitchensis, RUPRECHT. (=*Cryptogramme acrostichoides*, R. BROWN). Sitka. (Mihi ignota, Ledebour.)

A. faveolatus, RUPRECHT. Unalashka, Kadiak. (This species is the same as *Cryptogramme acrostichoides* R. BROWN. T.)

(*Phegopteris polypodioides*, FEE. Common at Unalashka, Afognak, and Attu. T.)

(*P. dryopteris*, FÉE. Abundant at Unalashka, Afognak, and Attu. T.)

Polypodium vulgare, L., (Abundant throughout the Aleutian Islands; grows amongst the tall grasses to a height of a foot, while on the rock ledges it attains a height of only an inch. T.)

Adiantum pedatum, L., (Common at Unalashka and Attu. Grows on the ledges of rocks which are covered with turf. It was not observed on the intermediate islands. T.)

Asplenium felix-fœmina, BERNH., Unalashka, Sitka, Kadiak. (Not common in the spruce woods of Afognak Island. T.)

ANOPHYTES.

[Determined and compiled by Thomas P. James.]

MUSCI.

Sphagnum cymbifolium, EHRH., Sitka.

S. teres, WAHL., Nulato.

S. cuspidatum, var. *recurvum*. BEAUV., Sitka.

S. acutifolium, EHRH., Sitka and Alaska.

S. fimbriatum, WILSON. Kotzebue Sound.

S. fimbriatum, var. ramis denso compactis, foliis brevioribus subellipticis; Norton Sound.

Weisia serrulata, FUNK., Nulato.

Dicranum crispum, HEDW., Kotzebue Sound.
D. polycarpum, EHRH., Alaska.
D. heteromallum, HEDW., Alaska.
D. congestum, BRID., Sitka.
D. scoparium, HEDW., Kotzebue Sound and Alaska.
D. elongatum, SCHWAEG., Kotzebue Sound.
D. palustre, BRID., var. foliis planis nec undulatis., Sitka, Nulato.
D. majus, SMITH., Sitka.
D. schraderi, SCHWAEG., Kotzebue Sound.
Barbula mülleri, BR. and SCH., Alaska.
Ceratodon purpureus, BRID., Kotzebue Sound, Sitka, Nulato.
Distichium capillaceum, BR. and SCH., Kotzebue Sound, Nulato.
Tetrophis pellucida, HEDW., Sitka.
Ulota barclayi, MITTEN., Sitka.
Racomitrium aciculare, BRID., Sitka.
R. fasciculare, BRID., Alaska.
R. canescens, var. *ericoides*, BRID., Sitka.
R. lanuginosum, BR. and SCH., Kotzebue Sound.
Tayloria serrata, BR. and SCH., Sitka.
Tetraplodon mnioides, HEDW., Kotzebue Sound, Sitka.
Splachnum sphæricum, HEDW., Norton Sound.
S. vasculosum, LINN., Sitka.
T. urceolatus, BR. and SCH., Kotzebue Sound.
Eucalyptra rhabdocarpa, SCHWAEG., Nulato.
Funaria hygrometrica, HEDW., Iktigalik.
Bartramia menziesii, HOOK., Western Russian America.
Conostomum boreale, SWARTZ., Kotzebue Sound.
Bryum polymorphum, BR. and SCH., Sitka.
B. nutans, SCHREB., Kotzebue Sound, Sitka, Iktigalik.
B. crudum, SCHREB., Iktigalik.
B. pyriforme, HEDW., Iktigalik.
B. lacustre, BRID., Kotzebue Sound.
B. inclinatum, BR. and SCH., Kotzebue Sound.
B. capillare, HEDW., Sitka.
B. argenteum, LINN., Iktigalik.
Mnium punctatum, HEDW., Sitka.
M. rostratum, SCHWAEG., Kotzebue Sound.
M. affine, var. *zelatum*, BR. and SCH., Sitka.
M. menziesii, HOOK., Sitka.
Aulacomnion turgidum, SCHWAEG., Kotzebue Sound.
A. palustre, SCHWAEG., Kotzebue Sound, Sitka, Nulato.
Pogonatum capillare, MICHX. and BRID., Kotzebue Sound, Sitka, Alaska.
P. alpinum, LINN., var. foliis capsulis longioribus. Kotzebue Sound and Sitka.
P. alpinum, var. *furcatum*, BRID., Schismareff Bay.
P. alpinum, var. *campanulatum*, BRID., Unalashka.
P. atrovirens, MITTEN., Sitka.
P. contortum, MENZ., Northwest coast of Russian America.
P. dentatum, MENZ., Northwest coast of Russian America.
Polytrichum gracile, MENZ., Kotzebue Sound.
P. formosum, HEDW., Alaska.
P. cavifolium, WILSON in Bot. Herald (Seemann)., Kotzebue Sound.
P. piliferum, SCHREB., Alaska.
P. juniperinum, WILLD., Kotzebue Sound, Nulato.
P. juniperinum, var. *strictum*, BR. and SCH., Kotzebue Sound and Sitka.

P. juniperinum, var. foliis distantibus, angustioribus patulis. Kotzebue Sound, Sitka, Nulato.
P. sexangulare, HOPP., Barren specimens from Herald Island.
P. commune, LINN., Sitka.
Antitrichia curtipendula, BRID., Sitka.
A. californica, LESYX., Alaska.
Neckera douglassii, HOOK., Stickine, Alaska.
N. menziesii, HOOK., Alaska.
Alsia californica, LESYX., Alaska.
Hypnum triquetrum, LINN., Nulato and Alaska.
H. loreum, LINN., Sitka and Alaska.
H. squarrosum, LINN., Sitka.
H. crispifolium, HOOK., N. W. Russian America.
H. laxifolium, HOOK., N. W. Russian America.
H. splendens, HEDW., Nulato and Alaska.
H. strigosum, HOFFM., Nulato.
H. undulatum, LINN., Sitka.
H. lutescens, HUDS., Kotzebue Sound and Alaska.
H. myosuroides, var. *stoloniferum*, HOOK., N. W. Russian America, Sitka, and Alaska.
H. ruthenicum, WEINM., Sitka.
H. schreberi, WILLD., Sitka.
H. stokesii, TURNER (not L. M.). Alaska.
H. uncinatum, HEDW., Kotzebue Sound.
H. uncinatum, var. *majus*, WILSON, twice as large as the ordinary form. Kotzebue Sound, Alaska.
H. revolvens, SWARTZ, Kotzebue Sound.
H. circinale, HOOK., Kotzebue Sound, Nulato, and Alaska.
H. rugosum, HEDW., Kotzebue Sound.
H. illecebrum, SCHWÆG., var. caulis divisionibus subdendroedus foliis subintegerrinus. Alaska.
H. rivulare, BR. and SCH., var. foliis minus acutis. Kotzebue Sound.
H. salebrosum? HOFFM., Kotzebue Sound.
H. nitens, SCHREB., Kotzebue Sound.
H. denticulatum, LINN., Sitka.
H. serpens, LINN., Alaska.

HEPATICÆ

Marchantia polymorpha, LINN., Alaska.
Fegatella conica, CORDA., Sitka and Iktigalik.
Fimbraria tenella, NEES? Alaska.
Jungermannia albicans, LINN., Alaska.
J. trichophylla, LINN., Alaska.
Scapania numerosa, NEES. Alaska.

LICHENES.

[List compiled by H. Mann.]

Spæhrophoron fragile, PERS.,
S. coralloides, PERS.,
Bœomyces icmadophilus, NYL., *Biatora icmadophylla*, auct.
Cladonia gracilis, HOFFM., Sitka, Kotzebue Sound.
C. pyxádata, ACH., Kotzebue Sound.
C. deformis, HOFFM., Kotzebue Sound.
C. uncialis, HOFFM., Sitka, Kotzebue Sound.
C. rangiferina, HOFFM., All Russian America.
C. sylvatica, ACH., All Russian America.
Pilophoron robustum, NYL., Islands of Bering's Straits.

P. aciculare, TUCK., (Sect. of *Stereocaulon.*) Russian America.
Stereocaulon paschale, LAWR., Kotzebue Sound.
S. tomentosum? FRIES. Kotzebue Sound and other localities. Absence of fruit renders determination doubtful.
Thamnolia vermiculare. Common.
Alectoria ochroleuca, FRIES. Kotzebue Sound, on the ground the normal form; also, var. *sarmentosa* pendant from the trees.
A. divergens, NYL., Various localities.
Cetraria islandica, ACH., Common.
Platysma cucullatum, HOFFM., Common.
P. septentrionale, NYL., Kotzebue Sound.
P. glaucum, NYL., Kotzebue Sound.
Nephroma arcticum, FRIES. Kotzebue Sound.
Peltigera venosa, HOFFM., Kotzebue Sound.
P. canina, HOFFM., Kotzebue Sound.
P. polydactyla, HOFFM., Kotzebue Sound, Sitka, &c.
P. apthosa, HOFFM., Kotzebue Sound, Sitka, &c.
Sticta pulmonacea, ACH., Kotzebue Sound, Sitka, &c.
S. scorbiculata, ACH., Kotzebue Sound.
Parmelia perforata, ACH., Kotzebue Sound.
P. perlata, ACH., Kotzebue Sound.
P. saxatilis, ACH., Kotzebue Sound.
P. tiliacea, ACH., Kotzebue Sound.
Physcia parietina, D. N., Kotzebue Sound.
P. stellaris, FRIES.
P. obscura, FRIES. Kotzebue Sound.
Lecanora pallescens, var. *upsalensis*, FRIES. Kotzebue Sound.
L. tartarica, var. *frigida*, ACH., Kotzebue Sound.
Placodium elegans, FRIES.
Proroma hypnorum, D C.,

FUNGI.

Dothidea betulina, var. *Betulæ nanæ*, FRIES. Kotzebue Sound.
Erineum roseum, SCHULTZ.

ALGÆ.

Fucus vesiculosus, L., Plentiful in Kotzebue Sound.
Alaria esculenta, GREV., Arctic coast.
Chorda filum, STACK.,
Dyctiosiphon fœniculaceus, GREV.,
Chætopteris plumosa, KUTZ.
Odonthalia dentata, var. *angusta*, HARV., Arctic coast.
(*Odonthalia kamtschatica.* Sannakh Island. T.)
Rhodomela larix, AG.
(*Rhodomela flocceosa.* Sannakh Island. T.)
Delesseria sinuosa, AG., Arctic Ocean.
(*Delesseria jürgensii.* Sannakh Island. T.)
(*Halosaccion ramentaceum.* Sannakh Island. T.)
(*Ptilota asplenoides.* Sannakh Island. T.)
(*Ptilota plumosa* var. *filicina.* Sannakh Island.)
(*Halidrys osmundacea.* Sannakh Island.)
Phyllophora brodiæi, J. AG. Arctic coast (single specimen broad-leaved variety.)
Alnfeldtia (*Gymnogongrus*) *plicata*, J. Ag. Arctic coast.
Nostoc verrucosum? Fresh-water pools at Point Clarence.

PART IV.—FISHES

The collection of fishes made by me was not large, owing to insufficiency of preservative material. Among those obtained were several new species and other interesting forms.

Under each species is given such notes as I was able to obtain; other species are included in order to give a general list of the principal food-fishes of those waters.

The systematic names and order of the list are taken from the Preliminary Catalogue of the Fishes of Alaskan and Adjacent Waters, by Dr. Tarleton H. Bean, of the U. S. Fish Commission, in the Proceedings of the U. S. National Museum, pages 239–272, 1880.

To Dr. Bean was given the labor of identifying the species obtained by me, and to him are due my kindest acknowledgments for the care with which he has performed the task.

GASTEROSTEIDÆ.

1. GASTEROSTEUS CATAPHRACTES (Pall.) Tilesius.

This species is quite common in the small streams which form the outlets of the lakes on the low grounds. They usually lie under the overhanging banks of the stream, and often will scarcely move when touched. The specimens taken by me were collected July 14, 1878, at Sannakh Island, the great sea-otter ground of Alaska.

2. GASTEROSTEUS MICROCEPHALUS Girard.

This species was taken at Sannakh Island, Alaska, in the same stream from which *G. cataphractes* was taken. There is no special difference in their habits.

Of the two species the former was the more abundant.

3. GASTEROSTEUS PUNGITIUS L. subsp. BRACHYPODA Bean.

This species is quite common in the fresh-water lakes and small streams on the low lands in the vicinity of Saint Michael's. They are more abundant in the brackish lakes formed by the overflow of high tides and waves. Where a small stream of fresh water falls into one of these brackish lakes these fish collect in great numbers, so that a handful may be taken at one time. The spines on the body can be depressed or elevated at will, and when the ventral spines are pressed a small stream of water is spurted out of them. A wound produced by the spines is extremely painful.

The natives eat these fish either raw or cooked.

The specimens obtained by me were collected in June, 1876, at Saint Michael's, Alaska.

PLEURONECTIDÆ.

5. PLEURONECTES STELLATUS Pallas.

At Saint Michael's the Flounders are quite numerous. They appear near the shores as soon as the winter's ice has left the shallower waters. During calm weather and toward the close of the day is the best time for taking these fish. They bite readily at the hook baited with any kind of flesh. The natives prize the flesh of these fish very highly.

During stormy weather these fish seek the deeper portions of the bays and coves. As soon as ice forms in the fall they retire to the deepest parts of the bays, where the water does not freeze.

Among the Aleutian Islands this species is extremely abundant and in some particular localities is the only fish to be found. The Aleuts care but little for this fish, and will often throw

them back in the water when caught. There is but little meat on them, and that is full of short, strong bones.

The Russian name of the Flounder is *Kámbal.* The smaller ones are called *Kambalúshka.* The Eskimo name of this species is *Na tŭ'g nŭk,* and is derived from the word *Ná tŭk,* signifying boot-sole.

6. PLEURONECTES GLACIALIS Pallas. (See Fig. I.)

This species has the same habits as *P. stellatus* at Saint Michael's. It is smaller in size than *P. stellatus.* The flesh is not so palatable as that of the other species.

Both species are liable to be diseased in the summer months. Great tumors appear on the sides at the bases of the fins and near the gills. They are so repulsive that one can scarcely eat the fish after seeing them in this condition.

During calm weather I have had opportunity to observe the habits of Flounders from the wharf at Saint Michael's and Unalashka. The fish towards evening usually come near the shore, especially when the tide is rising. The fish lie on the sandy bottom waiting for food to come in reach, or else by a quick movement of their fins throw the sand over their back so as to completely hide their body. After the sand has settled, a slight mark will lead to the detection of their hiding place. In the course of a few minutes a single eye of the fish will be thrust out for half an inch and slowly be moved round and round in search of food. Should a small fish come near it is instantly seized by the hidden Flounder.

At Saint Michael's I was once on the wharf where several natives were fishing. One of the natives was a woman who had but a few days before come from Nulató and had never seen a Flounder in her life. She soon caught one of these fish, and when she saw that it was different from any other fish she had ever seen her astonishment knew no bounds. The fish gave a flop and exposed its white lower parts. The woman gave a scream and shouted, "Slapjack Reba."

The word *slapjack* is universally known for the pancake or griddle-cake, and *reba* is the Russian word for fish. At the present time the Flounders are usually called "Slapjack Reba."

Neither species of the Flounders attain a greater size than fourteen inches in length, and rarely weigh over ten to eighteen ounces.

At Unalashka Island the Flounders attain a greater size than observed at Attu Island, and scarcely as large as some individuals seen at Saint Michael's.

12. HIPPOGLOSSUS VULGARIS Fleming.

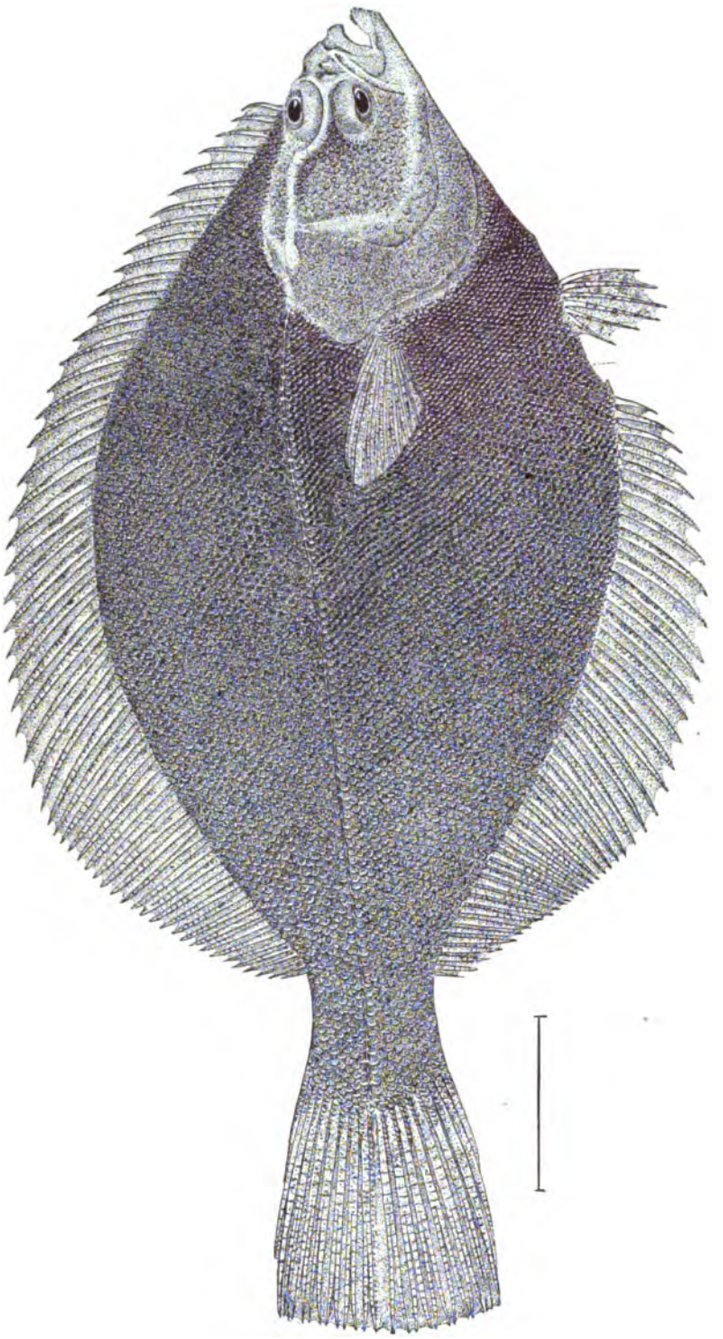
The Halibut is not common at Saint Michael's, and rarely attains a size of more than 20 inches in length and a weight of more than twelve pounds. It occurs in Norton Sound near the shores in the months of July, August, and September. It is doubtless migratory, as I never heard of it being obtained at any other time.

Among the Aleutian Islands it is a constant resident, and there attains an enormous size and weight. In some localities it has been caught weighing over 300 pounds. The larger individuals are extremely difficult to kill, and require a great amount of "playing" before being brought to the surface and there dispatched with a club ("*Kolotúshka*" of the Russian-speaking Aleut).

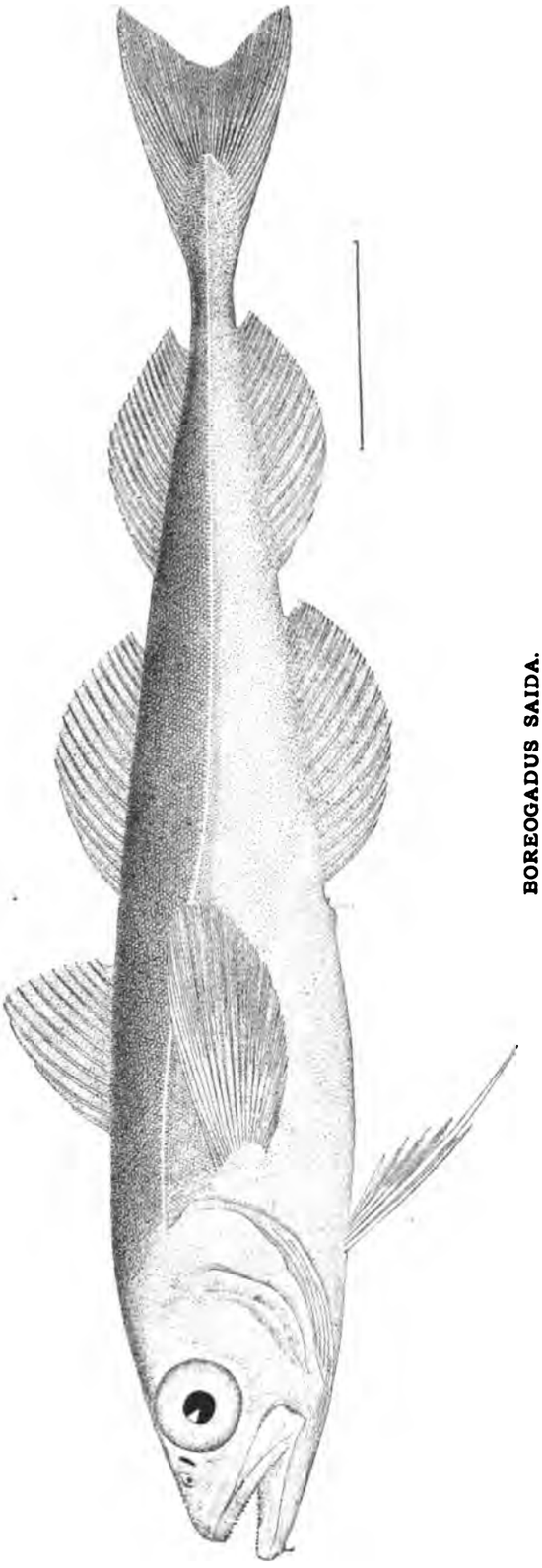
The fish are often taken while fishing for cod and other fish.

The usual method pursued by the Aleut of the present day is to make a wooden hook that resembles a shoe with the sole detached, excepting at the heel, from the upper. Through the part which I have likened to the sole of the shoe is driven a strong spike, usually three or four inches in length, and set at an angle of about forty degrees from the sole, and directed inward. The upper part is then fastened so that the under surface will be about an inch and a half from the point of the spike. The bait is securely fastened to the lower part, and when the fish attempts to swallow the bait, the upper lip is pushed on the spike by the interference of the upper part of the hook, so that any attempt of the fish to withdraw from the hook is only to transfix the upper jaw more firmly on the spike.

This hook is usually set in the early morning, and is watched from the house or shore. An inflated stomach of a seal is usually attached to the line as a float, and when it is seen to move, then it is known that a Halibut is at the bait. Other fish rarely attempt to take the bait, as the wooden



PLEURONECTES GLACIALIS.



BOREOGADUS SAIDA.

parts of the hook move round so that they are frightened off. Occasionally a large cod may be taken that way, but only the persistent endeavors of the Halibut enable it to be taken by this means.

At Attu Island the Halibut attains a great size, but the larger ones are rarely taken. The Atkhan Aleuts secure large fish of this species. At Atkha two canoes usually go together so as to assist each other in case of necessity. When a large Halibut is taken the man gives a signal to his comrade, and begins to tire the fish out. The comrade approaches so as to be near when the fish is drawn to the surface, as they are so strong that they have frequently upset the canoe of the fisherman, who is nearly always drowned if alone.

When the fish is exhausted it is drawn to the surface and struck on the head with the club used by all the Aleut fishermen. The one who comes as assistant is the person who does the killing, while the other holds the line, ready to give play at the least movement of the fish. After the fish has been killed it is secured between the two canoes and taken to land. This method is pursued only for large fish; the smaller ones are managed by a single fisherman.

The fish usually lie in water of 20 to 100 fathoms. The larger fish in the deeper water. Their flesh is excellent, but dry, unless properly cooked. The best way is to roast a large piece of the belly with a little water and scraps of fat pork, to keep the fish from becoming too dry. If properly attended to it makes a feast fit for a king. The natives usually boil the fish, a not very choice way of preparing it. Large strips are cut up and hung on poles or lines to dry. It becomes very hard, and unless it is not eaten with sufficient fatty substances it is not healthy. The dried strips are usually put in the stomach of a sea-lion and kept for winter consumption.

GADIDÆ.

15. BOREOGADUS SAIDA (Lepech.) Bean. (See Fig. II.)

The specimens of Arctic Cod collected by me were obtained in the latter part of February, 1877, the coldest month during a nearly four years stay at Saint Michael's.

Some natives had made holes in the ice in the bay, and were fishing through these holes when I visited them and obtained several specimens. This species was not observed at any other than the winter season. The natives informed me that they only occur in winter. They were obtained in about three and a half fathoms. I could not learn any particulars of their habits.

16. GADUS MORRHUA Linnæus.

The Cod of the North Pacific ranges to about latitude 64° 30′ N. on the American shores, and perhaps not so high on the Kamchatkan side. The limit of their northern boundary is the line of constant ice during midwinter, although the northern limit of these fish is not yet well made out.

The Cod fisheries of Alaska are of great importance, the banks very extensive, and containing an abundance of fish for all purposes.

The favorite localities are the Shumagin Islands, Cook's Inlet, and throughout the Aleutian Islands. North of Aliaska the best-known locality is about thirty miles northeast of Amák Island, and another of probably less importance lies thirty miles off shore from Cape Strogónof to the mouth of Sulima River. Among the Aleutian Islands, especially on the north side, a hook can scarcely be thrown in the water without taking a Cod. One of the localities where the best fish are taken among the Aleutian Islands is off the north head of Unalashka. Another is at the entrance to Nazan Harbor (Atkha Island) and on the north side of Atkha Island. Off the northeast shoulder of Kiska Island, and in recent years off the northwest shoulder of Attu Island, they are abundant.

I have learned of nothing that would lead me to believe in large migrations of the Aleutian Cod. They retire to the deeper waters of the neighborhood on the approach of winter, and draw near the land in May. They are most abundant in July and September in some localities, and in others in February and March. The time of their greatest abundance at any particular locality varies according to circumstances that are not yet well understood. While at Amchítka Island in 1881 I saw the bones of Codfish of such size as to excite wonder, yet I was informed by natives that the Cod only comes on the north side of that island in July and never stay later than the first of September. Bones of immense size were extremely abundant on the soil around the ancient village sites. At Attu

Island the Codfish are very numerous at the present day. They attain immense size there. I saw one individual in February, 1881, that weighed just out of the water an even thirty pounds. The fish was fat and vigorous. It was caught in water of about twenty-five fathoms. The natives ot Attu inform me that the Cod has not long been an inhabitant of the waters around that island. Its advent was near 1873. Previous to that time individuals had been obtained but rarely, and many of the men had not seen a Cod previous to that time. At Atkha Island the Cod also attains a great size. I have never seen a sickly fish at that place. In the entrance to the "Old Harbor" (*Starry Gaven*), on the north side, the old men repair in summer to catch the Cod to dry for winter. They assert that they are plentiful and of larger size than any other locality near that island.

At Unalashka these fish are very abundant and here unhealthy fish are quite common, though on the outside of the northeast point of the island large, healthy fish are taken in greatest abundance. The supply among the Aleutian Islands being always equal to the demand made on them. The natives frequently sell the surplus fish to the company, which salts them to send to the Pribylof Islands for the use of the people there. Of course only large fish are bought. The price paid is five cents in trade or money for each fish in the fresh, cleaned state. The size of the runs of fish depends greatly on the season and depth of water from which they are obtained. The larger fish are obtained from the deeper water. The average weight of the fish among the Aleutian waters will be about twelve pounds. Individuals of 18 to 24 pounds are quite common, while the majority of the catch will be about fifteen to sixteen pounds. It is possible that the off-shore fish will average one or two pounds more than the shore fish. Myriads of small Cod are to be seen round the wharves at Unalashka during the latter part of September, and all of October. These bite readily at the hook.

A piece of other fish is generally used for bait for catching Cod. The Codfish is one of the principal food-fishes of the Aleuts. They frequently go out to the banks, some miles off shore, and in the course of a few hours return with their canoe loaded down to the water's edge with fine fish. They prepare great quantities of these fish for winter's use by drying them. Their manner of preparing them is as follows: The head is partly severed from the body at the throat, the gills are taken out, a slit along the belly and the entrails are removed, the backbone is cut on each side and either removed as far as the tail, which is left to hold the two sides together to allow them to be hung over a pole, or else it is left in and dried with the body. When fish are abundant this is rarely done. The sides are then cut transversely through the flesh to the skin and the body then hung up by the tail to dry. During rainy weather an old seal-skin is tied over the bunches of fish to keep them dry as possible. When the fish are sufficiently dry they are stored away for future use. The ravens have a fine time watching the stages of drying fish, for if there is anything which a raven loves it is a fish that an Aleut has hung up to dry. The natives of Attu will not permit cats to be kept on the island, because the cats, which they formerly had, ate or destroyed more fish in one night than an Aleut woman could hang up in a day. It would be interesting to know how many Cod are taken by the Aleuts west of Unimak Pass. If each fisherman reported daily to the "Tyone" the number taken, the amount could be given to the agent of the company there, and at the end of the year a very nearly approximate total could be given.

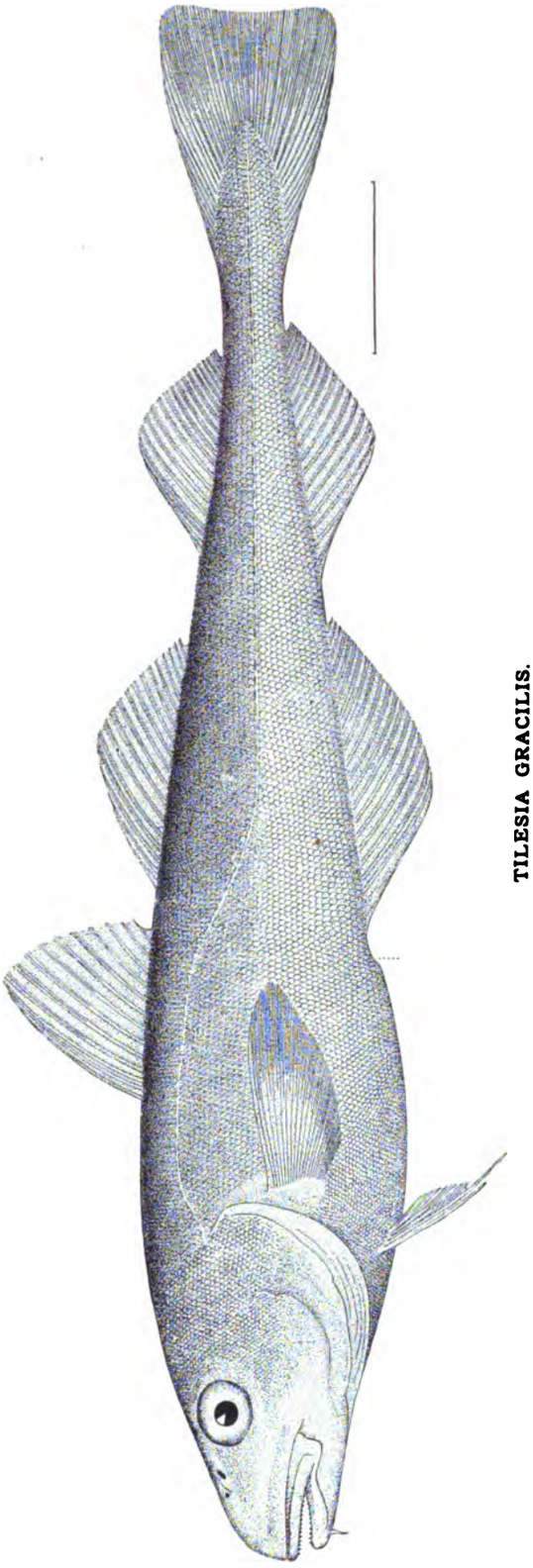
The appearance of the Cod is extremely variable. The darker-colored fish are generally the older ones, and most of them have a dark patch at the base of the head. The general color above is a variable dirty brown to dusky. The sides are pale brown to gray, becoming nearly pure white on the belly and lower side of the head. Back of the anal fin the color is generally the same as that of the middle of the sides of the body. The older fish have the more uniform colors, while the middle size and younger fish have the colors more distinct and the blotches are less confluent.

The ground color of the fish is also variable, being gray, yellowish, plumbeus, or even sooty.

The size and shape of the head are also extremely variable; in fact scarcely any two fish caught the same day will have similar heads.

18. TILESIA GRACILIS (Tiles) Swainson. (See Fig. III.)

This species is known to the natives and white residents of Saint Michael's district as *Vákh nya*, a word of uncertain origin, but supposed to have been introduced from Siberia, as it is used by the



TILESIA GRACILIS.

Russian-speaking population. The Eskimo name of this fish is *É káth loo úk.* Many of the white traders give this fish the English name of "Tom-cod."

Natives of Unalashka speak of the fish as *Vál.h nya*, a name used by all the Russian-speaking people where this species occurs.

At Saint Michael's this species is a constant resident, and wonderfully abundant at all seasons. In the spring, as soon as the ice goes out, they are caught from all the small points of land that project into the water. During the summer but few are caught as the abundance of other fishes make the Vakhnya little sought after.

When the ice in November has set, small holes of a few inches in diameter are cut through it. The thin ice which may form during the night is easily removed with the ice-pick, and scooped out with a small sieve-like scoop of a few inches in diameter, having a hoop made of bone, horn, or wood, and netted across with whalebone (baleen) or sinew. This scoop is also used to free the hole from slush which drifting snow may make during the day while fishing. The hook used by the Eskimo consists of a piece of slightly curved bone, ivory, or deer horn. A small piece of metal (preferably copper, as this will not be so easily broken as steel or iron) is sharpened and firmly set in the concave side of the shaft of the hook. No barb is used, as the weather is so cold in winter that the hands would be frozen in removing the fish, which the presence of the barb would render necessary. Without the barb the fish is detached instantly unless the hook is swallowed too far. Sometimes the hook is made to imitate the form of the sea-slug or other crustacean. The great secret is to keep the line taut, so that in drawing it to the surface the fish has no chance to become detached, but does so as soon as the line is slackened. The bait used is generally a piece of fresh fish of any kind. The bait is secured to the hook by two little sinew threads which are fastened to the upper part of the hook. This keeps the bait from being taken off by the fish, as in winter it would be serious work to fasten on bait every few minutes. All this is done before leaving the village. The line is generally made of whalebone (baleen), cut into long strips, and polished so that the water will not cling to it and freeze. The lower part of the line next the hook is sometimes made of strips of the shaft of the quill of a gull, goose, or swan, or the sinew from the wing of a swan is also used. Several of these snoods may be used on one line, and during times of abundance of fish each hook will have a fish on it.

Each of these materials has the property of not retaining the water on its surface, so that the line rarely becomes clogged with ice. A sinker is seldom used, excepting in summer fishing, and then may be a grooved stone from the beach, or often a piece of ivory is cut in imitation of a fish and tied on the line with the tail upward. This serves two purposes, one to represent a fish going down to seize the bait and make the live, big fish hurry up and bite, and secondly, to make less resistance when the line is drawn from the water. Just above the hooks are sometimes found small red beads, or the little red processes which are to be found on the base of the bill of the auklet (*Simorhynchus cristatellus*). These are also used as attractions for the fish.

The Eskimo fisherman, or woman, goes out early in the morning to the hole, which has been made the day before, for while cutting it out the fish are frightened away from it and nothing will be caught that time. The person takes a grass sack or basket along to carry the fish home in. A piece of old sealskin or grass mat is taken to sit on. On arrival at the place it is carefully cleaned out by means of the seine-like scoops with as little disturbance as possible, the line prepared and let down into the water. Ere many seconds one or two fish will be drawn out and slung high in the air; and, as they slap down on the ice they invariably become detached from the hook. The native is now in good humor, as an abundance of fish is indicated by their taking the hook when first put down. He takes off his glove and contentedly reaches behind his right ear for the quid of tobacco, which has lain there for the last twelve hours, covered by his abundant locks of hair; and, thrusting it far back between the teeth and cheek, calmly lets it soak while he pulls out dozens of Vakhni (plural form of the word). When he has caught a sufficient number he gives a signal for those on the lookout to come with a dog and sled to carry them home. During favorable times two or three bushels may be caught by a single fisherman. Any that are not wanted for home consumption are brought to the trading post and sold for so much per basketful of about 75 to 125 fish, the price being fifteen to twenty cents in trade, which represents six to nine cents in money. During the winter fishing a short pole is used, while in summer a long pole is held over the pro-

jecting ledge of rocks. The number of fish of this species consumed by the inhabitants of Norton Sound is enormous. They are used as food for man and dog. The natives either cook them by boiling, or else freeze and eat them raw. I have never eaten a boiled Vakhnya, neither do I desire to eat it. The flesh is rather firm, but in a very short time becomes watery. When they are fried hard and brown they do well enough as a change but not as a regular diet month after month. I have eaten them while frozen so hard that the flesh had to be shaved off with a knife, but there is so little fleshy fiber and so much water in the meat that it is like eating ice made from the water in which they were boiled.

The geographical distribution of this species is not well made out. They occur on the mainland shores of Alaska from Bering Strait to Kadiak Island. Among the Aleutian Islands I have seen this species only at Unalashka, and there only on two occasions and not half a dozen fish altogether. I do not believe that it occurs to the westward of that island, as all inquiries concerning it at Atkha and Attu elicited no information that led me to recognize this species as existing there.

The Eskimo assert that these fish spawn in February among the pebbles at the bottoms of the deeper portions of the bays. I have seen small fry of this species in the latter part of September and in October. They were about an inch to an inch and a half in length. They do not assemble in large schools, but seem to stream out irregularly along the beach and search round and round for food. There appears to be but little regularity in their method of moving from place to place for either young or old fish.

There is considerable individual variation in this species. Some have a darker color than others and a slightly different shape. The general color when fresh is a grayish brown above, becoming lighter on the sides and belly. Toward the tail the color is also lighter. Some individuals have small, darker colored spots on the sides; but this seems to be due to the effect of season, as the greater number of spotted fish are to be found in the winter months.

The size of this species is not great. They rarely attain a greater length than fifteen inches and not more than a pound and a quarter in weight.

19. LOTA MACULOSA (Le S.) Rich.

This species is the "*Losh*" of the Hudson Bay men; and the name has been introduced into Alaska also, as the Russians, in speaking of this fish, always use the word "Losh."

This fish attains a considerable size, often of more than four feet long and weighing sixty to seventy-five pounds. Their flesh is firm and dry, scarcely eatable, used principally as dog food. The liver is very large, and contains a great quantity of rich oil which is highly prized for cooking purposes by both whites and natives. When part of the oil has been removed from the liver the latter is then excellent food when fried and eaten hot. The roe also attains an immense size, and affords a very rich soup. This species is found only in the Yukon River, so far as my own knowledge is concerned. It is said to be abundant throughout the Hudson Bay territory.

I am not aware that it visits the sea. The lowest point on the Yukon River from which I could obtain any information was at the Mission, and from there up to Fort Yukon it is plentiful during the winter months. It is usualy taken in wooden (wicker) traps.

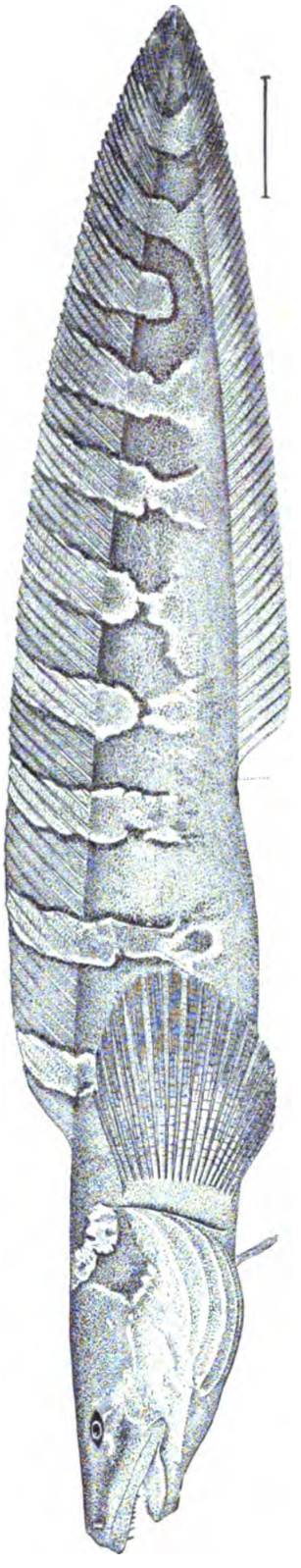
The specimens which I saw were brought from Nulato to be used for dog-feed while on a trip. They were too large too be preserved by any means at my disposal.

LYCODIDÆ.

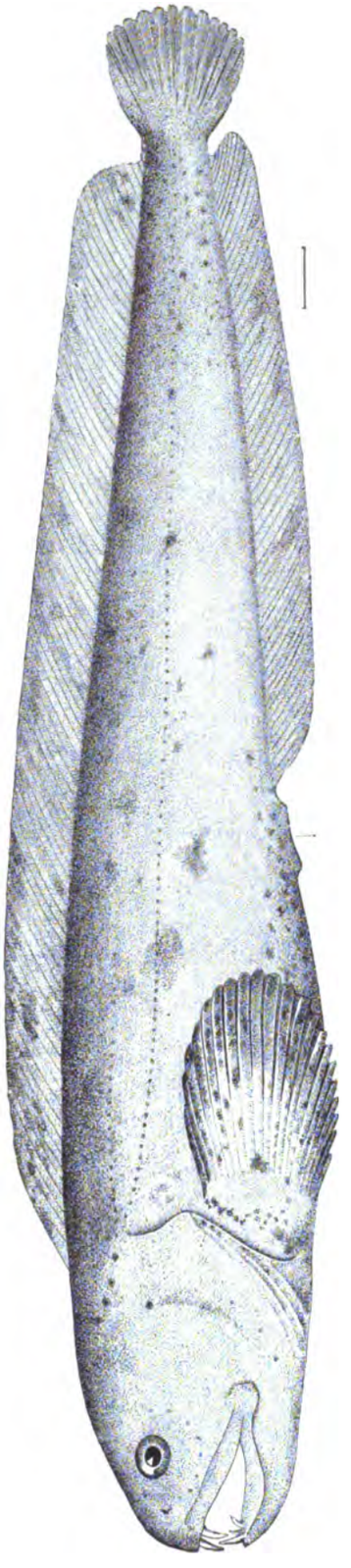
20. GYMNELIS VIRIDIS (Fabr.) Reinhardt.

The small fish discribed under this name were obtained at Saint Michael's, October 10, 1876. They are to be found at low tide under the flat stones in the muddy places along the beach. They scoop out the mud and a slight amount of water is retained in the depression until the return of the tide. They are very plentiful in such localities; as many as a half dozen may be found under a stone not over a foot in diameter. Their food consists of slugs and marine worms.

They are small in size, rarely over four or five inches in length and of very slender body. The color is uniform, dark sooty-brown with a greenish reflection when wet. Many interrupted bands of lighter color extend on sides and lower parts.



LYCODES TURNERII.



ANARRHICHAS LEPTURUS.

They are distributed along the coast as far north as Bering's Strait and on the Kamchatkan shore. They occur among the Aleutian Islands, but not so plentifully as farther north.

The Eskimo name of this species is *Kooth lw'y ŭk*, a name I could not get the signification of.

21. LYCODES TURNERI Bean. (See Fig. IV.)

A single specimen, of this hitherto unknown species, was collected March 28, 1876, at Saint Michael's, Alaska.

It was selected from among a lot of other fish, which had been caught through holes in the ice.

It is not a common fish, as it was the only one seen while at that place, hence nothing can be given of its habits.

This species has been fully described in Proc. U. S. National Museum, Vol. I, p. 463–466, 1878, by Dr. Tarleton H. Bean, of the U. S. Fish Commission.

STICHÆIDÆ.

23. STICHÆUS PUNCTATUS (Fabr.) Reinhardt.

A single individual of this species was collected at Saint Michael's, Alaska, June 29, 1874. It was picked up on the beach after a rather severe storm.

Previous to my finding this specimen it had not been detected on the Pacific coast.

The fish is quite small, about five and a half inches long.

It has no economic value, and is of rare occurrence.

A full description of this species, together with comparative tables with other specimens from the Atlantic, will be found in Proc. U. S. National Museum, Vol. I, p. 279–281, 1878, by Dr. Tarleton H. Bean, U. S. Fish Commission.

XIPHISTERIDÆ.

28. ANOPLARCHUS ATROPURPUREUS (Kittlitz) Gill.

This little fish is usually found associated with *Gymnelis viridis* and *Muræoides ornatus* under the flat stones among the silt washed from the high banks above.

This species rarely attains a greater size than six inches, and as it has no economic value it is of little importance.

30. MURÆNOIDES ORNATUS (Girard) Gill.

I obtained several specimens of this species at Atkha Island, May 29, 1879. They are abundant among the mud which has been washed from the high turf banks above and lodged between the crevices of the rocks in the water below. Where the various patches of seaweeds grow these fish may be found at low tide by turning aside the algæ. Sometimes a perfect nest, containing a dozen or more individuals, may be found in such a small place that it will be filled with these fish. It rarely attains a great size. The largest specimen was eleven inches. The smaller ones are a beautiful red color, dotted with minute black spots in life. This species occurs among all the Aleutian Islands. I am not aware that the natives use it for food.

ANARRHICHADIDÆ.

32. ANARRHICHAS LEPTURUS Bean. (See Fig. V.)

Two specimens were obtained at Saint Michael's, one June 24, 1876, the other June 10, 1877. This species had not previously been represented from the Pacific.

It is a migratory fish, coming to the shores at Saint Michael's as soon as the ice leaves the beach. It remains until ice forms in November. During the period between those dates it is quite plentiful. It frequents the rocky ledges, shelves, and points which have vegetation growing near the edge of the water. The Eskimo prize the flesh of this fish very highly. The meat is white, firm, and of a fine flavor. The Eskimo bait a large hook with tender grass roots and cast it into the water when the tide is at half flood in the evening, as the fish is mostly nocturnal in its habits. The part of the line near the hook is usually made of a stiff strip of baleen to prevent the numerous teeth of the fish from cutting the line in two. The strong teeth are used to tear

the sods of grass that may wash into the sea from the shore or cliff ledges into pieces to eat. My attention was once directed to a floating sod a short distance from the shore, going through strange motions. I called the attention of the native with me. He informed me that it was a *Koo chóo thlŭk* eating it. I well knew that that name was applied to this species. I directed the canoe toward the sod and saw the fish tearing it. It was with difficulty that we made the fish leave its food, and only after several thrusts at it with the paddle did it swim off. The natives told me how to catch them. I afterward saw them set their hooks, baited with grass-roots, and was assured that a fish would be taken by morning.

The upper parts and sides are uniform dark chocolate-brown in life. The abdomen is lighter, sometimes gray, clouded with brownish.

The natives strip the skin from this fish and tan it, to be used in inserting between the seams of boots and other waterproof garments. The skin of the fish is said to swell when moistened, and thus draw the threads tighter together. The dried skin is totally different from the fresh skin, in that it is nearly black and beautifully mottled with black and silvery dots.

I have not seen this species in any other locality, though it doubtless occurs in other portions of the waters of Bering Sea.

A full description of this species is given in Proc. U. S. National Museum, Vol. II, pp. 212–214, 1879, by Dr. Tarleton H. Bean, of the U. S. Fish Commission.

LIPARIDIDÆ.

LIPARIS CALLIODON (Pallas) Günther.

This small fish was collected by me at Saint Michael's, Alaska, in the early part of October, 1876. They are usually found attached to rocks by the sucker-like disk on the thorax. They rarely attain a greater length than three inches and are not common in that locality. The Eskimo name of this species is *Nŭp ĕ chŭk*, meaning *sucker*. They are of no economic importance.

38. LIPARIS CYCLOPUS Günther.

A single specimen of this species was obtained by me June 28, 1879, at Atkha Island. It is quite small, rarely attaining a length of over two and a half inches. It inhabits the shallow depressions in the rocky shelves of the beach where the tide overflows. It was not a common fish, as I saw but two specimens during the four months of my stay at the place.

AGONIDÆ.

40. SIPHAGONUS BARBATUS Steindachner.

A single specimen of this species was picked up dead on the beach at Iliuliuk village, Unalashka Island, in August, 1878. It was the only specimen seen there. I could obtain no information concerning its habits, excepting that the natives asserted that it is "a seaweed fish," leading me to infer that it frequented the patches of *fuci* and other *algæ*. It was shown to several persons at Attu Island. Those natives assured me that it is frequently found there. It is a small fish of only five and a half inches in length. It is not used for food.

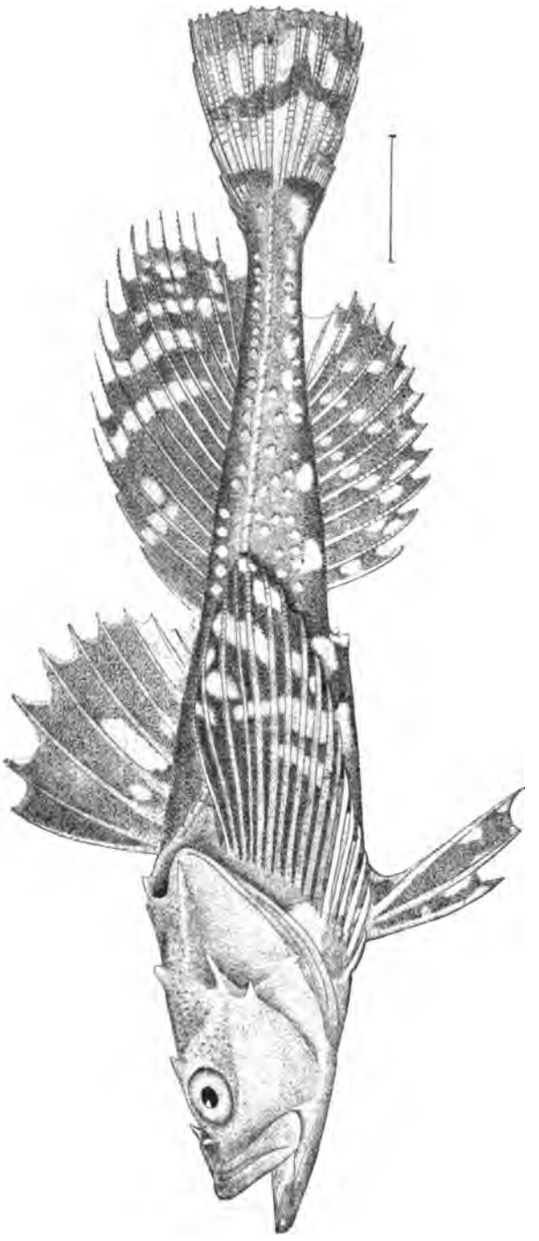
COTTIDÆ.

43. COTTUS TÆNIOPTERUS Kner. (See Fig. VI.)

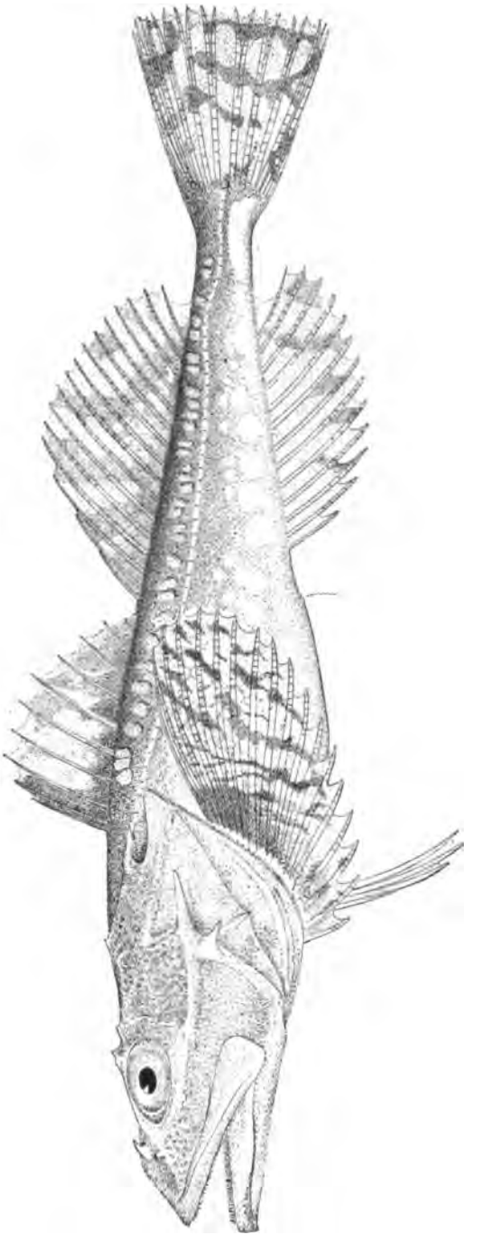
This species occurs abundantly throughout that part of the Territory north of the Aleutian Islands. It is a constant resident of Norton Sound. During the summer months they are extremely abundant. The Eskimo prize the flesh very highly, though they have so many subcutaneous parasites that I could not induce myself to touch the flesh.

They attain quite a large size, though the average is about a foot long. The head is so large that the body is quite small when prepared for the table.

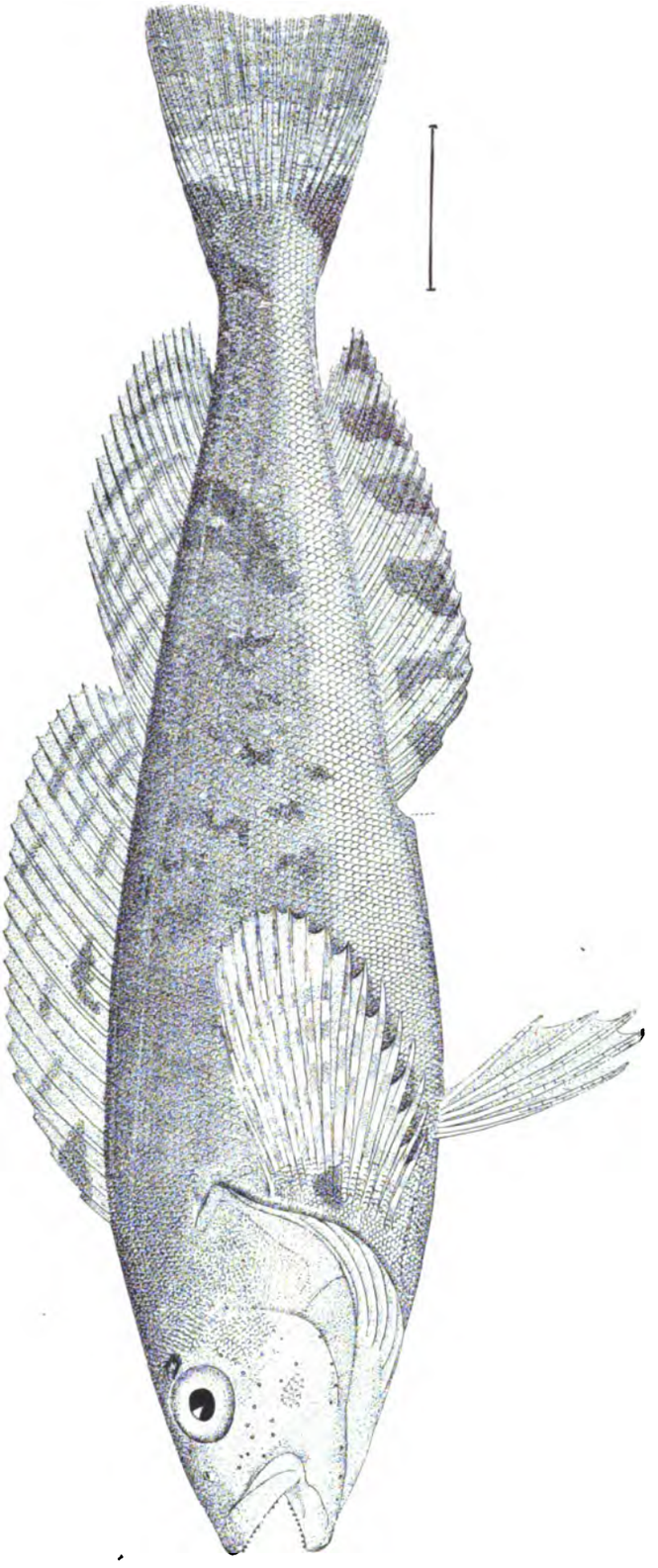
The general form of this species is much more slender than the others. The colors of the fresh fish are much varied, principally shades of gray and brown with large blotches of yellowish on the fins.



COTTUS TÆNIOPTERUS.



COTTUS HUMILIS.



HEXAGRAMMUS ASPER.

44. COTTUS POLYACANTHOCEPHALUS Pallas.

The Spiny-headed Sculpin is very abundant among all the Aleutian Islands. I am not aware that it occurs north of Aliaska on the American side.

It does not differ in habits from the other species, and like them is used for food by the Aleuts and some of the whites.

It attains a greater size than the preceding species, has a larger head and thicker body. The coloration is also different. The ground color is dark brown; sides and tail are more or less distinctly banded with yellowish; the dorsal fin has two oblique dark bands in front and three on the posterior part. The anal fin has four dark bands; each of the outer ones less evident.

The pectoral has three irregular bands of dark brown with yellowish spots. The caudal is obscurely banded with dark brown and tipped with yellowish.

46. COTTUS HUMILIS Bean. (See Fig. VII.)

This Sculpin is very abundant at Saint Michael's throughout the year. During winter they retire to the deeper portions of the bays. In summer they approach the shores and obtain most of their food during the flooding of the tide. They are not active; usually they progress a few feet and then rest quietly on the bottom. When a desirable object of food comes near they give a quick dash upon it. The size of the mouth makes up for any apparent lack of speed. The Eskimo call this species *Ká nukh pŭk*, or Big-mouth. The Russian name is *Kalág*, and is applied to all the species of this genus which occur there. The Sculpins are generally taken with hook and line. Any kind of fresh meat is used for bait. The fish are voracious feeders, and when caught with the steel hooks they frequently swallow the hook so deeply that the fish has to be ripped open to take it out. They are caught principally by the old women and men who are not able to go great distances to procure other food.

Other species of Sculpins occur in Alaskan waters, but a lack of means to preserve a great number of specimens necessitated my collecting only the most important.

54. HEMILEPIDOTUS JORDANI Bean.

A single specimen of this species was taken in October at Unalashka. It is a common species, and occurs throughout the Aleutian Islands. It attains a considerable size, often fourteen to sixteen inches in length. The general color above is umber-brown, becoming yellowish-brown below, with numerous spots and blotches of irregular size on sides and fins. This fish is considered excellent food. It is not infested with parasites like other fishes of its kind. They have similar habits with the true Sculpins.

CHIRIDÆ.

70. HEXAGRAMMUS ASPER Steller. (See Fig. VIII.)

This fish is known to the English-speaking people of Saint Michael's and the Unalashkan districts as "Rock-cod," and to the Russian-speaking population as "*Terpóog*," a word meaning a rasp.

The "*Terpóog*" frequents the rocky ledges, points of land which extend into the water, and shallow coves. Those places where the various kinds of sea-weeds abound are the best resorts for this fish. When the tide is high they seek their food among the rocky reefs. The natives value their flesh very highly. The meat is quite firm and contains few bones; it has a peculiar greenish color, but soon becomes light in color after the death of the fish. The women do most of the fishing for these fish. Any kind of fresh meat is used for bait. Frequently the women will be taken by the men to some favorite locality and remain there to fish while the men continue the journey in search of wood cast up on the beach, or go out to sea to catch Cod or other fish.

During the winter time the foxes of the Aleutian Islands catch many of these "Rock-cod," as they are left in the shallow lagoons or rock crevices by the receding tides. The fox is quite expert in catching the fish. He will watch them for a long time until they wander into the shallower water, upon which the fox springs, even immersing his entire head to seize the fish.

This species rarely attains a greater length than fourteen inches and a weight of a pound and a half to two pounds. Their distribution in Alaska is the entire coast south of Bering's Strait, and in-

cluding all the Aleutian Islands. The localities of greatest abundance are Attu, Atkha, Kiska, Unalashka, Sannakh and Unga.

71. HEXAGRAMMUS ORDINATUS (Cope) Bean.

This species was not obtained at Saint Michael's by me. It is extremely abundant among the Aleutian Islands. It has the same habits as the other species, and is known by the same name among the people of that region.

72. HEXAGRAMMUS SUPERCILIOSUS (Pall.) Jord. and Gilb.

This species does not differ in life habits from the other two. It is abundant throughout the Aleutian Islands. During the months of August, September, and part of October, the old men of the Attu take their wives and repair to some favorite haunt of these fish and while there they catch a supply, which is dried for winter use. The boys and girls go at low tides along the beach and with their hands search among the sea-weeds and rock crevices for these and other fish which are to be used as food. This species of fish is quite variable in coloration. The ground-color is black, varying to light brown, with blotches on the sides and abdomen of deep vermilion, shading to light umber.

This species is rarely over sixteen inches in length.

75. PLEUROGRAMMUS MONOPTERYGIUS (Pall.) Gill.

When I arrived at Unalashka in 1878 I heard much talk about the "Mackerel." During the summer of that year I had an opportunity of conversing with those who frequented the western islands of the Chain where these fish were said to abound. Several persons referred to these fish as "Spanish Mackerel," others called them "Horse Mackerel" and "Alaskan Mackerel," and under several scientific names. They were served at the table on several occasions, and all who ate of them highly praised their good qualities and spoke of their great resemblance in taste to the Atlantic Mackerel. It was not until in May, 1879, that I had an opportunity of visiting the locality where they were said to be abundant.

During the summer of 1879 I was at Atkha Island, and soon made inquiry concerning the fish. I was told that they make their appearance in the narrow pass between the islands of Atkha and Amlia about the 1st of June; and, that the fish invariably come from the Pacific Ocean, which here mingles its waters with that of Bering Sea.

The first arrivals of fish are the males of largest size and beauty of color. They arrive a few days before and await the arrival of the females and immature males.

By the 18th of June the fish have come in countless thousands. They arrange themselves with their heads toward the tide currents which rush violently through the pass. The flood tide sets in from the Pacific, while the ebb flows toward the Pacific, or, in other words, a southerly directed current for the ebb and a northerly directed current for the flood tide. The pass is very rocky, with numerous sunken rocks in the middle and on the eastern side. The western side of the pass has the deepest water and is three fathoms deep in the channel. On the north side of the pass numerous ledges of rocks, hidden rocks, kelp patches, and small islets of but few feet above the water's edge are to be found. It would be very difficult navigation for a vessel of over twenty tons to go through there with safety. The natives of the present day cross pretty well to the north side of the pass until they get under Amlia Island and then run near the shore of Amlia with their small *bidari* or open boats.

Among the sea-weeds or kelp patches on a cloudy day of clear lower atmosphere the fish may be seen in the following order:

The young males and immature females form a stratum of three or four fish deep and several feet wide, beneath these a second stratum of older males and females, whose roe is not yet developed, and will later, in the spawning season, take their place with those in the third stratum, which is composed of vigorous males and females. The latter are the most abundant. The female deposits her eggs on the kelp, though much of it must doubtless be lost by the swift currents washing it off. These males and females remain in this place until the spawning season is over, generally by the 20th of July. After which they gradually disperse and quickly find their

way back to the Pacific. Many times I have seen huge Halibut (*Hippoglossus vulgaris*), lying like large flagstones beneath the lower stratum of fish, waiting for one to come within reach. Without moving a great distance I could see over a dozen Halibut at a time. I estimated the weight of some of the larger ones to be not less than three hundred and fifty pounds.

The natives of Atkha repair to this place and have several turf houses of small size built there. It is also a garden spot where a few vegetables, such as radishes, turnips, and a few potatoes are planted. To attend to their gardens and to be near the fishing-grounds the Aleuts of many places have built these summer villages and call them *Layt nik*. Here assemble all the old men not able to hunt and the children and women of the hunters gone off on a summer's cruise for sea-otters. These lay in a store of dried and salted fish for their sons and friends. I made several visits to this place to learn the habits of the fish.

The natives obtain the greater number of the fish in the following manner. Each man has a two-holed bidarka (canoe). In it a small boy sits in the front hole while the old man sits in the rear hole. The man uses a pole of several feet in length (generally not less than 12 feet long), on which is firmly secured a hook of iron, having a flattened point with a sharp edge and a notch filed on the inner side to act as a barb. When the canoe arrives at the place the boy is ordered to seize hold of a strong frond of the Giant Kelp, which streams out sometimes for over a hundred feet, and among which the fish are most abundant. After coming thus to anchor, the man carefully thrusts the pole into the water, and if the fish are plentiful he will soon feel them surging against it. He now begins to jerk it up and down in the water to gig any fish that may come along. In a few seconds he brings one out. The work now becomes exciting, for scarcely has the pole been again thrust in the water than it is jerked into another fish. A man may thus, in a couple of hours, take two to three hundred fish. After the canoe is loaded it is taken to the shore, where the women slit open the back of the fish, take off the head, clean out the entrails, and with a cut on each side, the backbone is removed to the tail. The two sides of the fish are left hanging together by the tail. This is to enable the fish to be hung over a pole to dry. Often the men bring the fish directly to the principal village and clean them there, though this is done more often when the fish are to be salted. At the season between June 25th and July 25th the fish are extremely fat from the abundance of a small crustacean, which has previously come in myriads to the same places as these fish. The fish which are to be dried are usually taken about the 1st of August, as they are so fat before that time that I have seen the oil drip from the drying fish. They also, from the presence of the oil, become rancid in a short time, and are said not to keep so well.

At Attu Island I also had an excellent opportunity for studying the habits of these fish. At this place the fish are most abundant at the entrance to Chichagof Harbor on the northeast shoulder of the island. Several islets and many reefs are disposed nearly across the entrance to the harbor. Between these the tide currents run with great velocity. An abundance of large kelp patches is found in the vicinity. The fish arrive at Attu, from the southwestward, about the 24th of April, though this date varies according to the openness of the season. It is rarely later than the 1st of May. The fish come at first in a straggling manner, and their first appearance is made known by their being caught on hooks while the men are fishing for other kinds. The first comers are usually nearly adult males. They are not fat on arrival, but soon become so from the abundance of small crustaceans that fairly swarm among the patches of sea-weed by the 10th of May; and at which time the fish are tolerably numerous. By the 10th of June thousands of these fish can be seen in the shallow water (about one and a half to eight fathoms deep) below. The natives here take considerable quantities of these fish, and dry them for use at an early date. They rarely salt them, for reason that, they state, this fish makes the consumer thirsty. When they go to catch them they the visit the various localities known to be the haunts of these fish, and by looking beneath the mass of kelp fronds can see them if present; if not, the fish are off in the open water. They then watch every floating piece of detached sea-weed. It is constantly turning round and round like in an eddy of water. The fish are playing with it, and there will be found an abundance. The gaff is quickly thrust into the water, and one is soon struck and brought out.

I here had opportunity to come to the conclusion that these fish will bite readily at the hook. I saw them jump and struggle to get at the gaff and could feel them strike against it while it was

in the water, and at times it was impossible to hold it in position, as the mass of moving fish carried it along with them.

Any kind of fresh fish may be used as bait on a small cod-hook for these fish. A piece of scarlet flannel tied above the hook is good to attract the fish, as they will then bite voraciously.

With the hook a person can catch the fish as fast as put into the water. With the use of several hooks on one line several fish may be taken at once. With the gaff the fish are taken in great quantities, equal to all demands. The run lasts at Attu until July 25th, after which the fish are spent and slowly disappear from the waters.

These fish were not known at Attu previous to 1875. They came unexpectedly and were caught on hooks set for other fish. Since that time the people have had an abundance of them. From my own observations I am led to assert that 500 barrels of 200 pounds each can be procured at Attu in the season from June 1 to July 31. At the entrance to Chichagof Harbor is the only known locality at Attu where these fish resort. The natives assert that the coming of these fish was coincident with the disappearance of the sea-lion *Eumetopias stelleri;* and those natives maintain that the fish drove the sea-lions off. Just opposite to my own conclusions, for I think the fish come to those places where they will be least persecuted by the sea-lions.

These fish are also reported to be abundant at Kiska Island, between the islands of Atkha and Athákh. Also between Unálga and Unalashka, and also in the passes between some of the Shumagin Islands. I saw a few individuals in Captain's Harbor, Unalashka Island, in the early part of July, 1881. This is the first instance of their occurrence in that locality. They were small in size, and of the size which constitutes the upper stratum as spoken of in regard to the disposition of the fish on the spawning grounds of Amlia Pass.

This fish could be easily taken in great quantities, especially at Amlia Pass and Attu. Some writers of Alaskan affairs have mentioned exorbitant prices paid for a barrel of salted fish of this kind. They can be prepared at a cost of two dollars per barrel for the fish at either Attu or Amlia. The cost of the barrel and salt, of course, is to be added. Only the necessary sheds for protecting the barrels from the weather would have to be erected. Native help could be procured at a cost of a dollar per day for a man, and fifty to seventy-five cents per day for the women, who can clean the fish as expertly as the men.

Ere many years these fish will command a highly remunerative price to those who will engage in the enterprise.

Nothing has been done by either trading company in the matter of bringing these fish into a market.

In the beginning of this article I gave the various names used by the white people who have become acquainted with the fish only on reputation. The Russian-speaking people refer to them as *Soo dach kē*, a diminutive form of *Soo dák*, meaning a *sangre*, or *perch pike*. The natives of Unalashka and Atkha Islands speak of them, in the Aleutian language, as *Ta mŭ'th ghēs*, while the Attu people call them *Tŭ'v ween*. At Atkha, on June 18, 1880, I had several specimens brought to me for purposes of description, the notes of which are as follows:

Male, adult, June 18, 1880:

Dorsal outline, from anterior spine of dorsal fin, gradually sloping to the base of caudal; anterior to the dorsal fin the outline is descending for two fifths its length to end of snout, though having a slight upward curve directly in the center; anterior to the boundary of this prominence the occipital outline begins, and continues a direct slope to the end of the snout. The abdominal outline is moderately decurved; the post-abdominal line is nearly straight in its slight ascent to the base of the caudal ray. The thoracic and gill outline is gradually ascending to the base of the inter-maxillary bones, while the line from the base of these to the mentum is rather abrupt, ascending at an angle of forty-five degrees. The body has its greatest vertical depth at the base of the fourteenth spine of the dorsal fin. The greatest lateral thickness is at the intersection of the same line at a right angle, gradually becoming thinner as it approaches the base of the anal fin, where it preserves a uniform thickness, giving great strength to the caudal rays. The coloration is extremely variable, generally dark (light in some specimens), olive (nearly approaching black in some specimens) on the dorsum and above the median lateral line; below this line, especially on the sides, and posterior to the vent, are five bands, or bars, the three anterior bands becoming obscure

on the abdomen, the anterior of which is less evident than the second, but is intensified in outline as the bands succeed posteriorly to the last, which entirely encircles the fish. These bands vary much in width and depth of coloration. (The adult males which first arrive have the colors much subdued, and not until the height of the spawning season do they assume their vivid colors.) These bands are of the general color of the dorsum, variable shades of olive. The color between the bands is golden yellow to reddish orange yellow, straw and lemon yellow, and each having a coppery reflection, making a contrast of extreme splendor.

The lighter-colored parts are evanescent to a great degree, and are soon faded on the death of the fish. They then turn dark plumbeus and gradually fade to a lusterless white; numerous white patches then appear on various parts of the body. If the fish is soon preserved in salt, or other substance, the bands of color do not entirely disappear.

The head is large, stout; bones firmly knitted together; nostril small, above which is a noticeable depression in the nasal bone.

Mouth medium sized, directed slightly obliquely upward when closed and nearly circular when opened; lower lip moderately pendant, upper lip thick and rolled back. The teeth are small and weak. Eye large; orbit strong, irregularly oval, longest diameter in a line from corner of mouth to anterior spine of dorsal. The upper-outline of the orbit slopes obliquely in front, presenting a peculiarly formed contour, being four fifths as high as long and one-fourth the length of the head to end of nasal bone, and equal to two-thirds the width of interorbital space, and one and three-fourths times the distance of anterior edge of orbit to middle of nostril.

Operculum narrow and strong, waved on upper edge, and concavely outlined; lower edge moderately convex; the posterior side of operculum is irregular, the upper corner of which is above the center of the posterior third of the opercular bone, thus: forming a subtriangle in outline.

The gill rays are seven, forming a rounded outline with the gill covers.

Dorsal fin moderately curved, attaining greatest height at eighth ray and preserving this height to the eighteenth, then decurved to the twenty-third, then ascending to the twenty-ninth, gradually arching to the thirty-sixth, and decurving to the forty-seventh or last.

The dorsal rays are moderately strong, and arched backward. The soft membrane is considerably depressed between the spines. The height of the longest dorsal spine is contained $6\frac{1}{4}$ times in the length of the dorsal fin and equals the distance from the first to the eighth spine of the anterior part of the fin and the last ten of the soft rays. The third soft ray is equal to two-fifths the height of the eighth spine.

The pectoral fin has a rounded outline, rather stout, contains twenty-five rays, of which the sixth to thirteenth are of the same length. The longest rays are two and one-fourth times the height of the eighth to eighteenth dorsal, each ray terminating in soft membrane. The insertion of the pectoral is wide and fleshy, equal to one-half its length.

The ventral fins, long and weak, contain six rays, each terminating in filaments, the third ray forming a long point behind; the base is equal to one-fourth the length of longest ray, the rays much branching.

The anal fin contains twenty-four rays, of which the third to the eleventh are the longest, though they all form a convex outline; the penultimate ray is equal to two-fifths the length of the anterior ray.

The caudal fin is notched for half its length, the edges of the notch waved half as deep as its length at medan line, forming a deep notched, nearly heart-shaped caudal fin. The scales are small, smooth, disposed in four rows between dorsal fin and upper lateral line; eighteen to eleven rows of scales between first (upper) and second lateral lines, which extends from edge of operculum to the end of the tail, and is 147 scales in length; the upper lateral line contains 219 scales from tail to bifurcation (of lateral line) on the dorsum. The point of bifurcation of upper lateral line on dorsum is eleven scales anterior to the first dorsal spine; the prolongation of upper lateral line at bifurcation is five scales. A third lateral line extends from just in front of the lower insertion of the pectoral fin, and continues between the abdominal and pectoral to even with the end of the prostrate twelfth ray of the pectoral, where its end is brought down and continues for 59 scales, then interrupted for the distance of the length of the pectoral fin, then continued 41 scales, terminating abruptly.

A fourth lateral line begins just beneath the in gill covers, passes between the abdominal fins, and contains 48 scales; it then bifurcates at a line beneath half the length of the ventral fin, then diverges to arch over the anus, passes a straight line of five scales above the anal fin to terminate at the insertion of the inferior caudal ray, and contains 151 scales from its bifurcation to caudal ray.

The number of lateral lines varies, as does also their relative position on the side of the fish; however, the number of lateral lines is never less than three, the absent one being the second one from above. The greater percentage of males have four lateral lines, while some of the females have but three.

The intestine is about twice the length of the fish less the tail.

The milt of the male is waxy white and of firm consistence in the fresh specimens. The females have the roe disposed in two folds about six inches long and an inch in diameter, tapering at both ends. The eggs of the female when matured for spawning are about the size of a number twelve shot, and have a dark grayish spot on one side of them.

At Attu I saw a small specimen of this species on October 11th. I thought it to be a fish of the preceding year, as it was about two inches long and too large to have been of that year's spawn, unless they grow very rapidly.

UMBRIDÆ.

82. DALLIA PECTORALIS Bean. (See Fig. IX.)

A new genus has been established for this fish by Dr. T. H. Bean,* of the U. S. Fish Commission, and dedicated to Mr. W. H. Dall, of the United States Coast Survey, in appreciation of his contributions to the zoology of Alaska.

The generic characters are as follows: DALLIA, gen. nov. *Umbridæ?*

Body oblong, covered with cycloid scales of small size with radiated striæ; lateral line not conspicuous; eye smaller than *Umbra;* cleft of the mouth of moderate width. Ventrals inserted in front of the beginning of the dorsal, composed of three rays. Basis of anal as long as, or longer than, that of dorsal. Caudal fin rounded and many-rayed. Villiform teeth on the intermaxillaries, the mandible, the vomer, and the palatines. Pectoral rounded and many-rayed.

DALLIA PECTORALIS, sp. nov., Bean.

B. VII–VIII; D. 12–14; A. 14–16; V. 3; P. 33–36; C. 30–33.

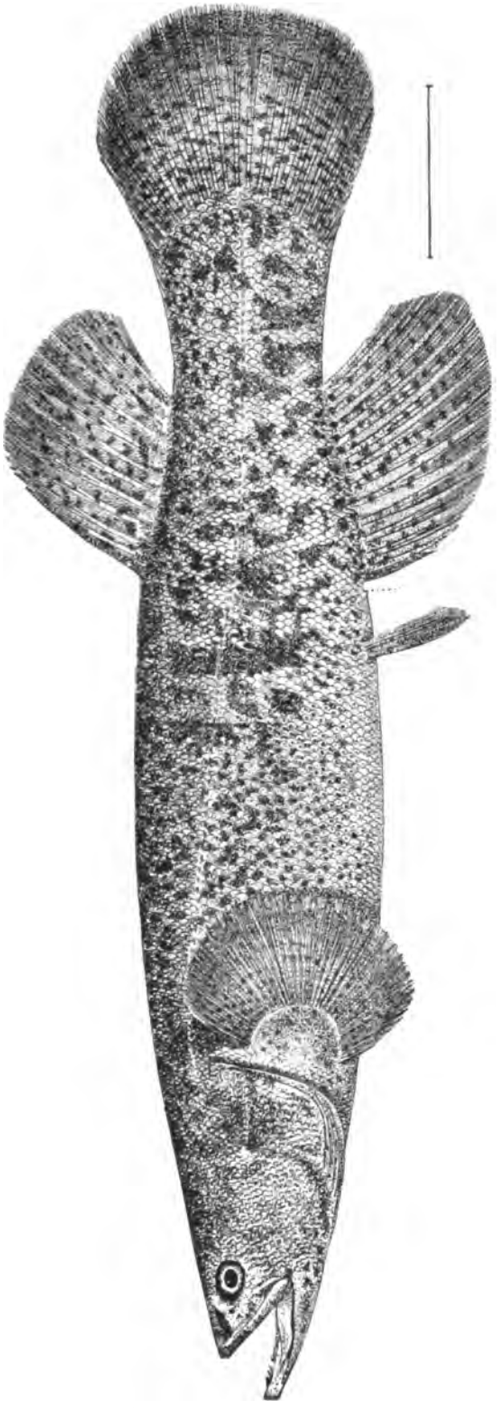
The height of the body is contained four to four and one-half times in its length without caudal; length of head four and one-fourth to four and one-half times. The eye is one-seventh to one-sixth as large as the head. The pectoral is one-half as long as the head to end of upper jaw, the ventrals one-third as long. The origin of the dorsal is twice as far from the end of the snout as from the origin of the middle caudal rays. The longest dorsal rays are a little more than half the length of the head. The anal begins almost directly under the origin of the dorsal and has nearly the same extent; its longest rays equal or slightly exceed the longest dorsal rays. The ventrals originate in advance of the dorsal, and can be made to reach to or slightly beyond the origin of the anal. The vent is immediately in front of the beginning of the anal. About 77 scales in lateral line; eleven rows of scales between the dorsal and the lateral line, and eleven rows between the lateral line and the anal.

Color.—Dusky brown mottled with whitish, all the fins similarly colored, the dusky spots sometimes becoming confluent on the caudal and simulating bands; belly mainly whitish, but in some specimens thickly covered with small dusky spots.

LIST OF SPECIMENS.

23496 *a–g.* (collector's number, 1430) 7 specimens. Saint Michael's, Alaska, February, 1877. L. M. Turner.
23498 *a.* D. 13; A. 16; V. 3; P. 36; C. 33; B. 8. Length 205mm.

*The description, as given above, together with the ray formulæ, was taken from Proceedings of the U. S. National Museum, volume 2, pages 358–9, of Descriptions of some genera and species of Alaskan fishes, by Dr. Tarleton H. Bean.



DALLIA PECTORALIS.

23498 *b*. D. 13; A. 14; V. 3; P. 33; C. 31; B. 7–8. Length 200mm.
23498 *c*. D. 14; A. 15; V. 3; P. 33; C. 31; B. 8. Length 180mm.
23498 *d*. D. 14; A. 14; V. 3; P. 33; C. 30; B. 7–8. Length 184mm.
23498 *e*. D. 13; A. 14; V. 3; P. 35; C. 30; B. 8. Length 175mm.
23498 *f*. D. 14; A. 14; V. 3; P. 35; C. 30; B. 8. Length 170mm.
23498 *g*. D. 13; A. 14; V. 3; P. 35; C. 31; B. 8. Length 167mm.

This species is probably the most abundant of all the fishes which occur in the fresh and brackish waters of the northern part of Alaska. It is known to the whites as "Black-fish," to the Russian-speaking population as "Chórnia Reeba," and to the Eskimo as *Ē máng ŭk*."

It is found in all the small streams of the low grounds, in the wet morasses and sphagnum-covered areas, which are soaked with water and which at times seem to contain but sufficient water to more than moisten the skin of the fish. In the low grounds or tundra are many, countless thousands, small ponds of very slight depth, connected with each other by small streams of variable width, of few feet to those so narrow as to be hidden by the overlapping sedges or sphagnum moss. These smaller streams are said to have been made by the muskrats and mink, which travel from pond to pond in search of food. These narrower outlets of the ponds are at certain seasons so full of these fish that they completely block them up. The soft, yielding sphagnum moss above is pushed aside, and under it these fish find a convenient retreat. Here the fish are partially protected from the great cold of winter by the covering of moss and grass. In such situations they collect in such numbers that figures fail to express an adequate idea of their numbers. They are to be measured by the yard. Their mass is deep according the nature of the retreat. If it is a pond overgrown with sedges and mosses which by their non-conductivity of heat allows only a slight depth to be thawed out in the short Arctic summer, the fish mass will completely fill it up. The natives repair to the places, which are known to be the refuge of these fish, and set a small trap constructed after the following manner: A number of small splints of spruce wood are carefully bound together so as to make a conical-formed weir some eight feet in length, the smaller end of which is opened about two to three inches. This communicates with a large basket-shaped trap, which is so placed that when the fish enter the small orifice next the trap they will scarcely find it by which to make their exit. The larger end of the funnel is ten to eighteen inches in diameter and set with the mouth toward the direction from which the mass of fish is moving. The fish push on until the basket is filled, their number prevent those within from moving outward until the whole trap is a mass of living fish. The natives remove the basket every day or two to relieve the pressure on it and to supply their own wants and those of their dogs. Nearly every head of a family has a trap, and during the greater part of the year, from May to December, tons and tons of these fish are daily removed. They form the principal food of the natives living between the Yukon Delta and the Kuskokvim River and as far interior as the bases of the higher hills. North of the Yukon Delta they are also abundant, especially on the sphagnum-covered areas back of Kothlik and Pikmiktalik. The natives sell many of these fish in baskets (they are sold by the basketful), a few cents paying for about three-fourths of a bushel. When taken from the traps the fish are immediately put into these baskets and taken to the village, where the baskets of fish are placed on stages, or *caches*, out of the way of the dogs. Here the fish are exposed to the severe temperature and cold winds. The mass of fish in each basket is frozen in a few minutes; and when required to take them out they have to be chopped out with an ax or beaten with a club to divide them into pieces of sufficient size to be fed to the dogs, or put into the pot to boil.

The vitality of these fish is astonishing. They will remain in those grass-baskets for weeks, and when brought into the house and thawed out they will be as lively as ever. The pieces which are thrown to the ravenous dogs are eagerly swallowed; the animal heat of the dog's stomach thaws the fish out, whereupon its movements soon cause the dog to vomit it up alive. This I have *seen*, but have heard some even more wonderful stories of this fish.

The food of these fish has always been a matter of wonder to me, considering the number of fish to be supplied in the scanty waters where they abound.

The contents of several stomachs were examined and found to contain only a mass of undistinguishable earthy matter, vegetable fragments, and what appeared to be the undigested portions

of skins of small worms which frequent the ponds and low grounds. I was unable to save any specimens of worms, supposed to be larvæ of some kind, as the alcohol in which they were placed reduced them to an unrecognizable condition.

The spawning season is in June and July, or as soon as the lagoons thaw out sufficiently. The eggs are deposited in the vegetable slime at the bottoms of the shallow ponds.

MICROSTOMIDÆ.

83. OSMERUS DENTEX Steindachner. (See Fig. X.)

The smelt arrives sparingly at Saint Michael's about the 1st of June. The first appearance of the fish is generally known from its being caught with others in small shore-seines or else on a hook set for other fish; though they rarely bite at the hook in those waters. By the middle of June the fish have become abundant. They appear to come from the southwest, and arrive in small schools at the beginning of their approach to the shore, and later come in schools of several yards wide and many rods in length. They swim along the shore, seeking places to spawn. The spawning season begins in the latter part of June and continues until the middle of July. The eggs are deposited among the sea-weeds, which grow just below the surface of the lowest tides. They disappear by the last of July.

The Eskimo catch great quantities of these fish and dry them in the air. The fish are generally obtained by means of a short seine about twice or three times as long as wide. The fish are then drawn on shore, where they remain in heaps until the women take the entrails out by a dextrous pinch of the thumb and forefinger, which tears apart the flesh between the gills and belly. The forefinger is then run inside the fish and the belly ripped open, which same movement takes out the offal. The women in the fall have prepared great quantities of grass blades, which are twisted into a thin rope, which is run through the gills and out the mouth of the fish, or else the strands of the rope are twisted around the fish's head as the rope is made. These strings of fish are then hung on poles in the open air. After having dried for a sufficient time the fish are then stored in the *caches*.

When dried these fish are not bad eating, as there is sufficient oil in them to prevent their drying too hard, and yet not enough to become too rancid.

The Eskimo name of these fish is *Ĭthl kwág nŭk*.

I have not seen this species among the Aleutian Islands, though it doubtless occurs there.

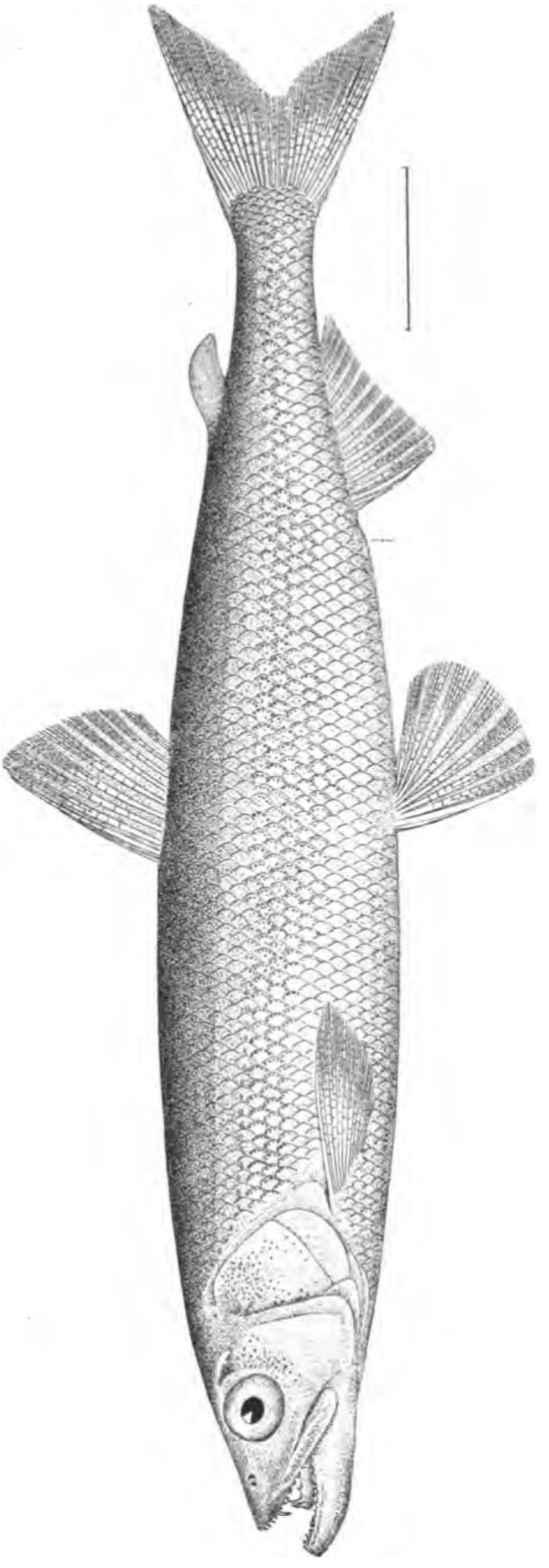
85. MALLOTUS VILLOSUS (Müller) Cuv.

This species ranges over the entire coast line of Bering Sea. On the American side they are most abundant south of latitude 60°; and, above that are known to me only from a few specimens seen in the dried state with another fish, *Hypomesus olidus*.

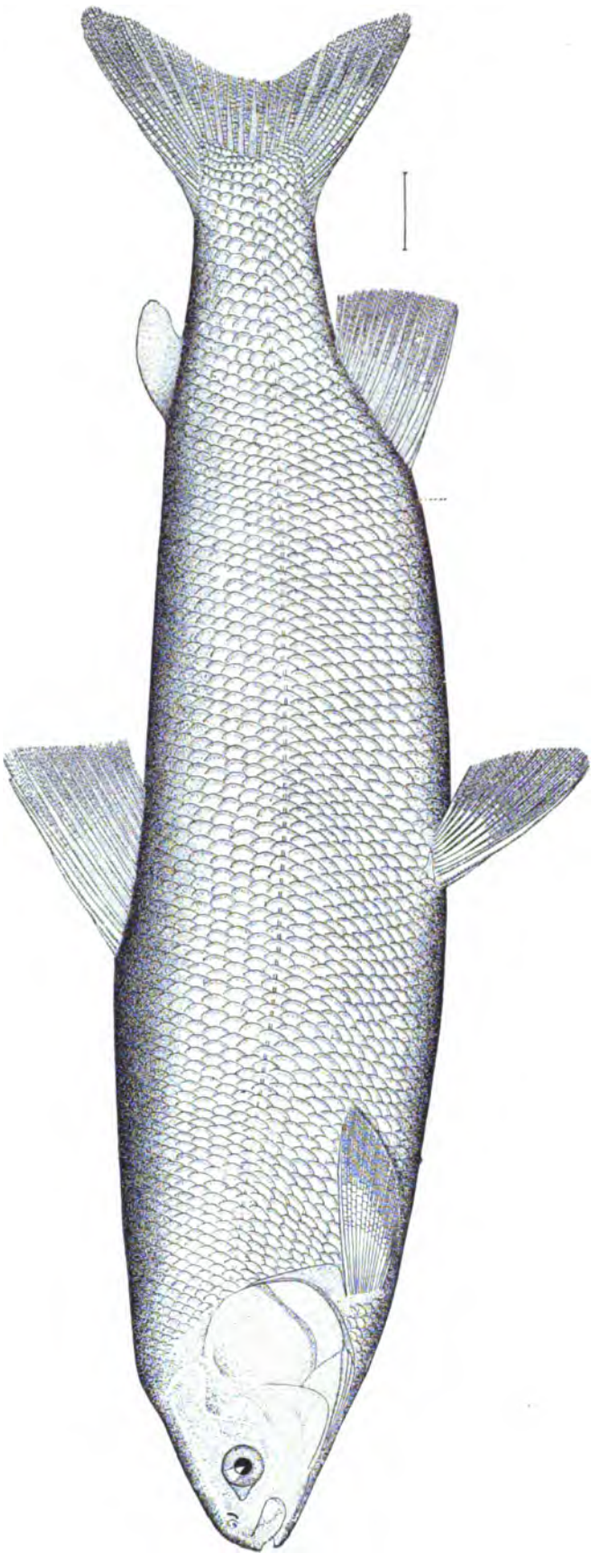
Among the Aleutian islands these fish abound in incredible numbers.

At Atkha Island in 1879 I had an opportunity to observe these fish as they came in to the sandy beach of Nazan Bay to spawn. The 21st of July of that year a boy brought a basket of these fish and asked me to buy them. I inquired where he had obtained them. He replied that they were abundant along the sandy beach not far from the village. I immediately went to the place and found that the waves of the preceding day had thrown millions of these fish on the beach. The number was increasing every time a wave was broken on the beach. The fish come to the sandy beach to spawn, and when a high wave runs on the sandy flat the fish cast their spawn at that time. The spawn is covered with the sand, which the retreating wave washes back with it. The dead fish were so thick on the beach that it was impossible to walk without stepping on hundreds of them. They could be gathered with a shovel, they laid so thickly. The spawn is very small, the eggs not larger than the size of half a pin-head, and is extended in small masses, which are held together by a viscid mass which is ejected at the same time. If the sand does not cover it instantly the mass is soon nothing but a small rounded ball about a quarter of an inch in diameter, of fine sand held together by the egg mass. This is rolled over and over by each wave until it is but little injured by the action of the waves.

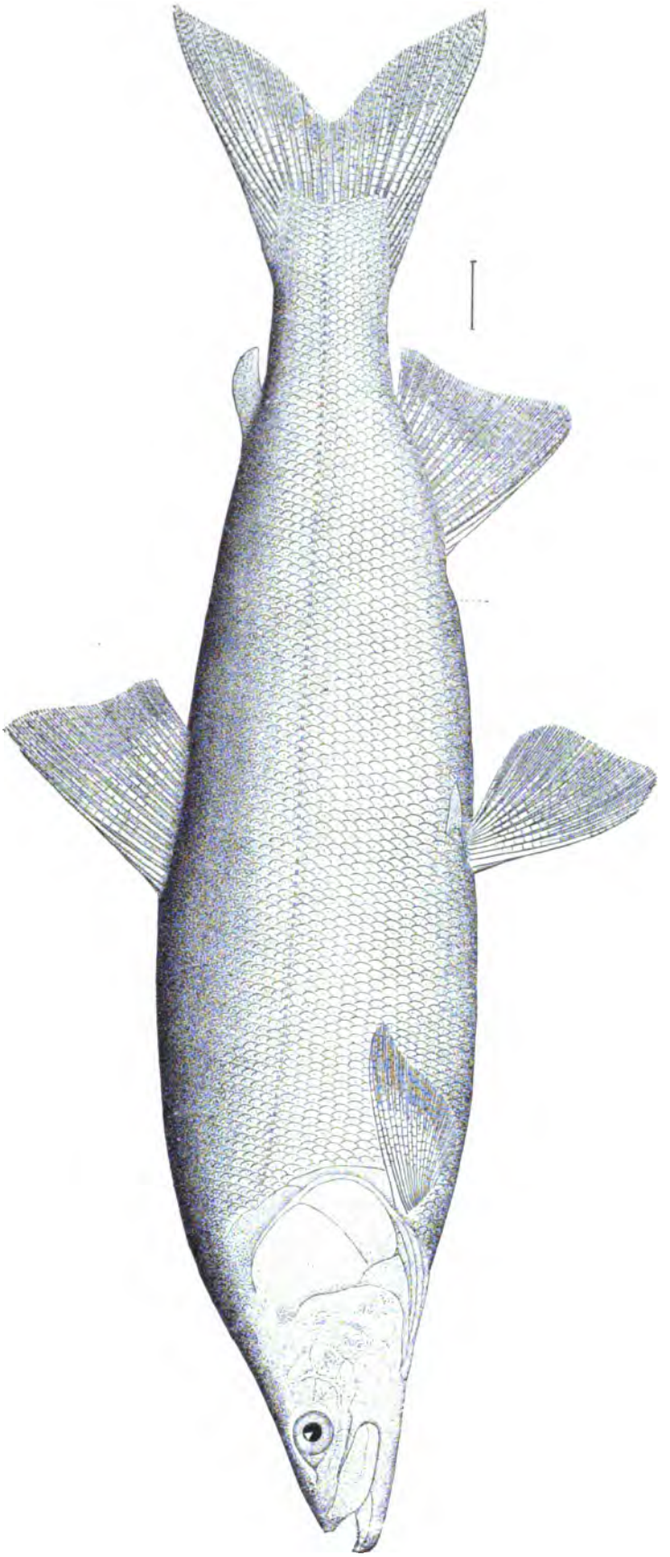
The eggs which are hidden by the sand soon show signs of life, usually about thirty days after deposit. The beach then becomes a quivering mass of eggs and sand. As soon as the eggs are



OSMERUS DENTEX.



COREGONUS KENNICOTTI.



STENODUS MACKENZII.

hatched the fry are washed back into the sea by the waves. The natives assert that these fish deposit their spawn only in the places against which the waves will wash when the fish-fry are ready to be hatched.

The natives prepare great quantities of these fish by drying them in the air. They are not cleaned; a blade of strong grass is twisted between the gills and neck, which makes a rope of fish. These ropes will sometimes be many yards in length.

At Attu these fish are said to be very abundant every third year. This was also stated to be a fact at Atkha. One thing is certain that they were very plentiful at Atkha in 1879, and not in 1880 or '81, and that they were not at Attu in 1880, and were reported to have been abundant in 1878.

The Gulls, Terns, Sea-lions, Killer-whales and Hair-seals have a great liking for these little fish. Thousands of Gulls and Terns were hovering over the schools of these fish at Atkha in 1879.

At Unalashka Island these fish are said to be common at times, but I could get no definite information concerning them. The Russian-speaking people call them "*Kŏ' rŭsh ke.*"

I know of no fish which has a sweeter taste than this species. When fried to a rich brown color they are excellent. The head is all that is necessary to be removed, as the entrails contain nothing.

86. HYPOMESUS OLIDUS (Pall.) Gill.

This little fish abounds at Saint Michael's as soon as the shore ice is lifted sufficiently to allow them to pass under and through the little streams which, the rapidly-melting snow filling up the fresh water ponds and lakes, have made their way through the sands to the sea. These fish ascend to the lakes by these small streams. So many are hurried onward by the necessity of soon casting their spawn in the lakes that they choke up the streams which lead into them. The ponds are frequtly very near the sea-level, and only separated from the sea by the barrier of sand thrown up by the surf, and at extreme high tides and waves are brackish. Into these, great quantities of drift wood is thrown. These ponds seem to be preferred by these fishes. In one large pond, of nearly half an acre in extent, a few miles from Saint Michael's, these fish were found in incredible numbers. The date was May 20, 1877, by which time they were in such numbers that the natives procured thousands of them by thrusting a stick into the water and throwing them out with it. A small dip net was also used, which brought out two or three gallons at a time. When fried these fish possess a sweetish taste, and are excellent eating. The natives at Saint Michael's dry these fish on strings of grass. I did not have time to investigate their spawning habits.

COREGONIDÆ.

75 (of Appendix). STENODUS MACKENZII Richardson. (See Fig. XII.)

This large Whitefish occurs plentifully throughout the Yukon River and tributaries. It attains a great size, weighing sixty pounds, and reported to be of greater weight, and is a valuable food fish. Numbers are procured at the Yukon Delta in the winter by cutting through the ice and setting wicker-traps for them. The natives bring quantities of these fish to Saint Michael's to sell. When roasted the flesh is excellent. The specimens seen by me were of such condition and size that I could not preserve them.

The Russian name of this species is *Nélma*. The Eskimo name is *Chē*. This species is distinguishable by the presence of weak teeth, strongly projecting lower jaw, pale plumbeous dorsum and upper sides, becoming silvery white below.

89. COREGONUS LAURETTÆ Bean.

This species is quite small, rarely over fifteen inches in length. The dorsal and abdominal outlines are but little curved; the head is small, lower jaw projecting but slightly. This fish in the Yukon River is poor in quality of flesh and bony, it being there considered the poorest of all the Whitefish. It is most abundant at Nulato, on the Yukon River. Dr. T. H. Bean, of the U. S. Fish Commission, informs me that this species occurs plentifully in the neighborhood of Bering Strait and that the fish from that locality are excellent eating. It is a well-known fact throughout

Alaska that localities of but short distances apart make greatest differences in the quality of the flesh of various kinds of fish.

The Russian name of this species is *Nulatovsky cigá.*

90. COREGONUS MERCKII Günther (var. ?).

This species prefers the larger tide lagoons and streams which are slightly brackish and contain muddy water. This fish is abundant in September to the middle of December. The flesh is very fine and fat. It is at that time quite abundant. The natives set nets across the tide water streams when the tide is high, and as it recedes the fish retire toward the bays and are caught by the obstructing net.

This species is the *Morskoi cigá* of the Russians.

The coloration is darker than in the other species. The head is well formed and has a slightly projecting lower jaw. The entire fish is rarely over ten inches in length, and weighs about three-quarters of a pound.

91. COREGONUS CLUPEIFORMIS (Mitchill) Milner.

This species is the largest of the genus; it often attains a weight of over thirty pounds. It is very abundant in November to January in the Lower Yukon. It is less abundant in summer. It spawns in September and October. The flesh is excellent when roasted. Many of these fish are caught in traps set in the ice, after the middle of November.

The color is somewhat lighter than *Stenodus;* the lower jaw is shorter than the upper; the scales large, as are also the fins. The head is moderate, seeming small on account of the stricture at the nape; the teeth small and deciduous.

This species is the *Maksún* of the Russians, and *Chē* of the Eskimo.

93. COREGONUS QUADRILATERALIS Richardson.

This species is quite small, rarely attaining a greater length than fourteen inches. It is extremely abundant at the mouth of the Yukon in the early winter months, and has a range throughout the entire river, as young of this species about four inches in length were obtained from Fort Yukon in the early part of June, 1877. They were the fish of the preceding winter. This species is not very delicate eating. The form is peculiar, as its name indicates. The head is small and attenuated, the lower jaw shorter than the upper. This species is called *Krūg* by the Russians.

There are two other well-marked species of *Coregoni* in the Yukon district. I did not have the opportunity to procure specimens.

The Russians refer to one of them as *Gorbata,* signifying *humped,* or arched back. I am not certain to which species this should be referred. Several individuals of this species came to my notice, but were obtained in January at Kothlik, near the Yukon Delta, and brought to Saint Michael's on the sled with other fish. The fins were so broken by being frozen that the specimens were worthless. The second species may be the one referred to as *C. kennicottii** by Mr. Milner. Not having specimens of my own collecting, I am not able to state positively that this is the species, but it is more than probable, as Mr. W. H. Dall collected it at Nulato, on the Yukon, March 27, 1867.†

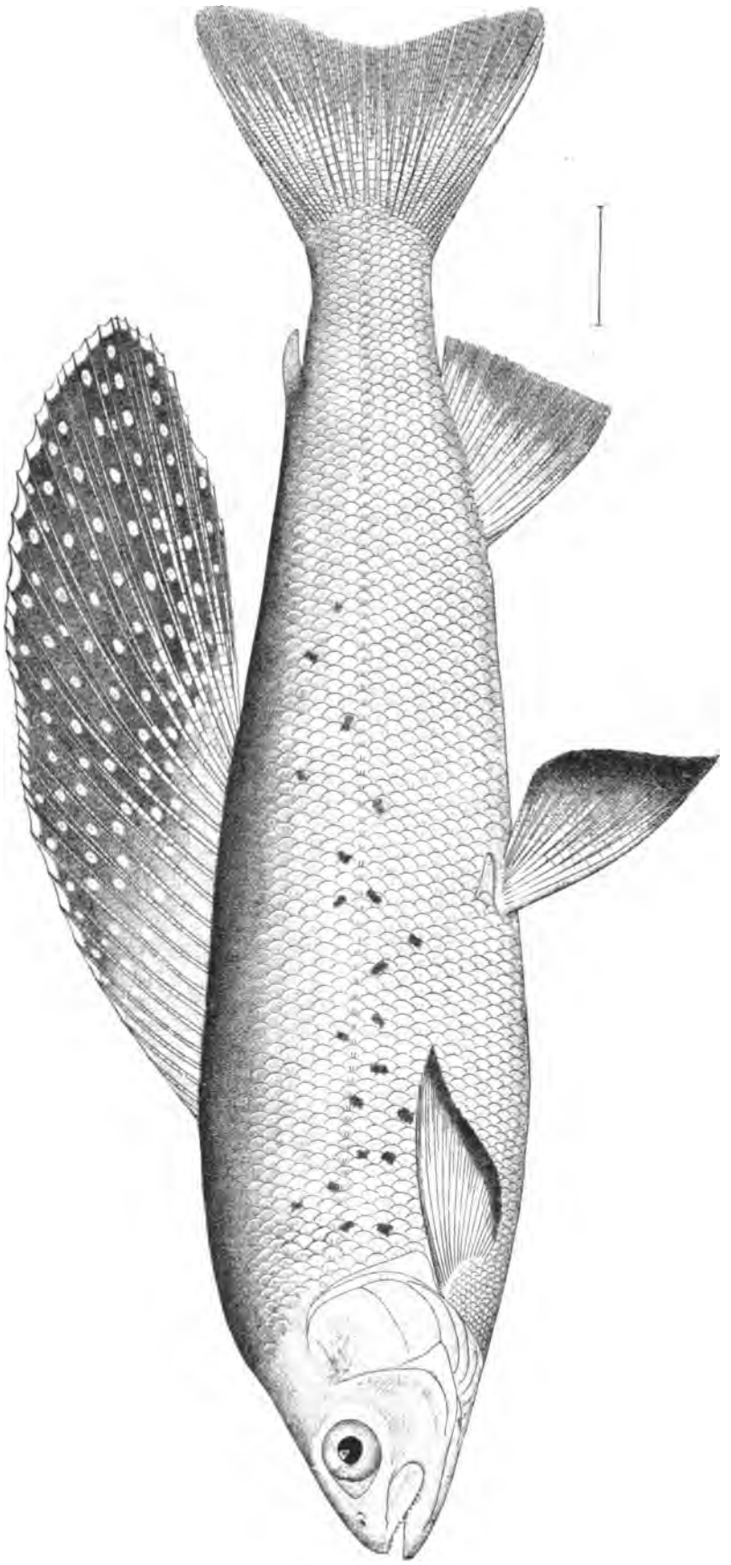
SALMONIDÆ.

95. SALVELINUS MALMA (Walb.) Jordan and Gilbert.

The Salmon-trout is a resident of the smaller streams of the mainland and islands. It comes from the sea in September in great numbers into the rivers emptying into Norton Sound. In the latter part of October the natives put down wicker-traps and catch great quantities of these fish. They are brought to Saint Michael's by the sled-load and sold. In the month of July they descend

*A figure (No. XI) of this well-marked species is inserted in order to show the characters of it. Specimens, now in the collection of the U. S. Nat. Museum, were procured at Nulato, Alaska, by W. H. Dall; and, from these the drawing was prepared.

†The occurrence of the Grayling in those waters is of sufficient importance to warrant the insertion of a figure of THYMALLUS SIGNIFER (Rich.) Cuv. & Val. Specimens were secured by H. M. Bannister at St. Michael's, and by W. H. Dall at Nulato. (See Fig. XIII.)



THYMALLUS SIGNIFER.

the streams and remain in the sea until September. The more northern localities have the larger individuals, those among the Aleutian Islands being smaller than those seen at Saint Michael's, and which are of the same size and color as those seen at Karluk, on Kadiak Island. At this place great numbers are seined from the river and salted for market in San Francisco. The average weight of those prepared for market is near two and a half pounds.

The natives of the Aleutian Islands make but little use of these fish, as they are taken most abundantly during the season when the salmon are plentiful.

I am not prepared to state whether there is any special difference or not between the fish found in the small streams of the Aleutian Islands and those referred to under this article. As the brook fish of the islands have not the red spots on the sides and have never been seen to attain such size as that of the species at the head of this article, they will be treated of as a separate species until known to be otherwise. They have habits which are essentially different in that they seldom go to the sea for more than six weeks of time in September and October, and that they dig out the banks where the current is deflected from a point above, and under these banks collect in great numbers. They are poor and lean in the spring, and not until late in August do they become fat. They are in April and May reduced to mere skeletons in some localities. They are abundant at Unalashka, Atkha, and Attu. They have black spots on the sides, and the general color is very dark. After the large fish have returned from the sea they are lighter in color and have white edges to the fins.

A lack of preserving material prevented me from procuring specimens of these fish. They are referred to by the white people as Brook-trout in contradistinction to the Salmon-trout as meant by *Salvelinus malma*. During the late summer the Brook-trout are caught by means of the fly, or, in lieu of that, a piece of salmon, or the roe of the salmon, is good bait. This same species is reported to be abundant on Nunivak Island, and also on Unga Island. It doubtless occurs in all the mountain streams south of latitude 62° N.

The Russian name of this species is *Goletz*.

99. ONCORHYNCHUS CHOUICHA (Walb.) Jordan and Gilbert.

This species attains the largest size of any of its genus, weighing from sixty to one hundred pounds. Some individuals have been taken which were said to have weighed one hundred and forty pounds. The range of this species in Alaska is from Sitka to Bering Strait, and it is found in all the considerable streams of the mainland. It arrives at the mouth of the rivers south of the peninsula of Aliaska in the month of May or early part of June. In those rivers north of the peninsula it arrives according to the season, being in the Nushagak River rarely later than the 8th of June and a few days later in the Kuskokoim River. At the Yukon Delta they arrive about the 10th to the 20th of June, a few days earlier or later, depending on the ice in the river breaking up, generally occurring about that time before it is removed from the delta. The fish remain outside for several days before entering the fresh water so as to accustom themselves to the change of water. The larger fish usually enter first. They are the healthier and strongest fish which have been able to make their way in advance of the others. By the 1st of July they have ascended about 400 miles of the Yukon and by the middle of the month are a thousand miles from its mouth. The stronger fish ascend the river for several hundred miles beyond that point. The natives, Eskimo and Indians, prepare immense quantities of these fish for future use. The fish are caught in various ways. The Eskimo usually set nets of short dimensions, fastened at one end to the shore off a point of rocks, the other end let into water of one to two fathoms deep. Floats of variously shaped pieces of wood prevent the net from sinking too deep and dragging on the bottom against the jagged rocks. The nets are set in the evening as the fish approach the shore during the late hours of the day and early hours of the morning, or between 10 p. m. and 5. a. m. The meshes of the net are made so that when stretched out diagonally they will be five to nine inches across. The fish in attempting to pass through are caught by the gills, hence cannot pass through or go backward. Early in the morning the men visit the net and secure the fish by first drawing them to the surface and striking them over the head with a club. Several hundred pounds are frequently caught in a single set gill-net of that description. The natives of the rivers use the same kind of nets, and usually take these nets in their single canoes and descend the stream. The net is thrown overboard; and, as the

fish are ascending they come in contact with the net. They either become entangled in the meshes or else in their struggles the net becomes so wrapped around them that escape is impossible. They are drawn to the surface and dispatched by a blow on the head. The fish is quickly put in the canoe and the descent of the river is continued until the canoe is loaded. During the time when the water in the river is muddy the fish cannot perceive the net at a great distance and rely on their own strength to break through the barrier. In ascending the streams the fish keep near the shore to avoid the strength of the current and also to feel the change of water which may issue from the tributaries of the main stream. The natives then also catch many of the larger fish by means of spears, to which a thong is attached so as to be able to withdraw the fish when struck.

When the fish are to be prepared for drying, the head is first severed from the body, the belly ripped open, the entrails and other inner parts are removed. The backbone is removed by a slit lengthwise, dividing the ribs from it, and then cutting down through the skin. The fish is then left so that the two sides are attached only at the tail. These pieces are then thrown over a pole or staging, with the flesh side out, so as to dry as rapidly as possible. Should the fish be large several transverse incisions are made in the flesh to facilitate the process of drying.

Among the Indians of the Yukon this species is prepared so as to make a first-rate grade of *ūkali* (the Russian word for all kinds of dried fish). The fish is carefully cleaned; the back bone taken out with as many of the attached ribs as possible; in most instances, especially if the fish is large, all the bones, except the fins, are carefully removed. The fish is hung up for several days, until it has dried out to a certain degree. The fish are so full of oil that among those people who have not the opportunity of procuring real oil, excepting what is brought to them by the Eskimo for trade, wooden vessels are placed under the fish to obtain the oil as it drips from the fish when drying. This oil is eaten as food, or is saved until winter to use in the lamps. After the oil has dripped out and the fish is somewhat dried, the pieces are then separated and placed between layers of birch bark, formed so that the pressure of the fish and weight of stones, put on the pile of fish, squeezes out nearly all the oil in the flesh. This oil is also saved for use in the dwellings. The fish, by this pressure, become very dry, yet not too much so. This process secures a first-rate article of *ukali*, which is much sought for by the traders.

The inferior grades of dried fish are used as dog-feed. A fish which weighs, when fresh, about 60 pounds will make about 25 pounds of ukali. When the backbone is dried with the rest of the body, it then forms three slices. This is done only with those fish which are of an inferior grade, and are intended for dog-feed, though they are used by the natives as well.

The exact localities where this species spawns was not determined to my satisfaction. They have such an expanse of water to range over that among the numerous tributaries it would be a very difficult matter to ascertain their spawning places. It is, doubtless, above Nulato on the Yukon River. The run of this species lasts in the Yukon for about twenty-five days, the best fish being the first, while the last are weak and frequently immature fish. After spawning the fish become exhausted, and are thrown on the beach in immense quantities.

At the Kuskokvim River this species is not so plentiful as in either the Yukon or the Nushagak River. On the north side of Aliaska the fish are most abundant in the rivers in the following order; Yukon, Nushagak, Ugasik, Kuskokvim, and Kvi'chuk, the latter being the outlet of Ilyamna Lake.

North of Unalakhlit this species is not to be found in considerable numbers, it being there replaced by other species.

Among the Aleutian Islands this species is not often obtained. It appears there to be a mere straggler, and among the eastern islands of the chain not more than a couple of dozens are taken in a year. I saw a fine female, which had spawned and had returned to the sea, taken at Unalashka, September 25, 1878. This individual weighed 38 pounds, and was in excellent condition for the table. It was taken while seining for other species of salmon.

At Atkha Island this species is occasionally taken in the early spring, but not more than half a dozen are yearly procured.

At Attu they are rarely seen. But one was taken in 1879, and one in 1880. Both were taken in the latter part of September.

Great quantities of these fish are salted by the white people of the Saint Michael's district for

home consumption. A few barrels of bellies (the choicest part of the fish) are sent to particular friends in other parts of the territory, and a few reach San Francisco. At Nushagak the Alaska Commercial Company has a supply prepared to be taken to the Pribylof Islands for the natives at that place.

At Nushagak, in 1878, a large trap was made of spruce splints fastened to stakes driven into the soft bed of the river. The doorway was so placed that the fish entered, when ascending from the sea, and continued to a chamber by a tortuous passage-way; and, as the consecutive chambers led against the stream the fish constantly struggled to the innermost parts of the trap. The ingress was so small that it would be difficult for the fish to return by it. I have seen several hundred fish, at one tide, taken in the trap, and not one of the fish weighed less than 20 pounds, ranging from that up to 60 pounds. They frequently burst the trap sides, from the pressure of their bodies, when the tide recedes. At this time the fish are taken out and salted.

The further north the fish are found the better the quality of the flesh. The white people, who have had an opportunity of eating the fish from the various localities named above, invariably pronounce the Yukon fish to be the better, and a difference may be detected in the flavor of the fish from each locality.

The flesh is so oily that fat of any kind is unnecessary when frying. The pan is made hot and a thin steak not over half an inch in thickness is placed in it; a sufficient oil is soon tried out to cook the fish to a rich, crisp brown. The fish should be eaten while hot, as it loses its fine flavor when cold.

The color of the fresh flesh is variable in this species; some of the individuals being an orange red, others having a yellowish-red color, others a deep-red orange. The blood is quite dark. The color of the spawn is reddish orange to a light-reddish brown. The eggs are large, and lie in two great masses, one on each side. When the eggs are mature they are nearly one-fifth of an inch in diameter. The milt of the male is also in two sacks and is of a light ashy color. The milt is generally about one-third the size of the roe of a female of the same weight, though the roe of the female will weigh several pounds if she be a large fish.

The fish present the following color, though there is considerable individual variation: Head, nape, dorsum, and tail dark plumbeus, nearly black in some individuals and of a greenish cast in others. The sides are light plumbeus, the belly grayish or ashy. The fins are generally much darker than the other portions of the body. The Russian-speaking people call this species *Chavícha*, a word derived from the Kamchadale language and applied to this or kindred species. The Eskimo of Saint Michael's vicinity call this species *Tak zhák fŭk* meaning the big *salt-water*, from the word *ták zhŭk*, meaning *sea* and used also for *salt*. The Aleutian name of this salmon is *A mé ung*.

100. ONCHORHYNCHUS KETA (Walb.) Gill and Jordan.

This species rarely attains a great weight. The largest individuals weigh as much as 12 pounds in the fresh state.

This species arrives at Saint Michael's about the 15th of July and continue to run for about three weeks. These fish prefer the smaller streams, and when ascending the largest rivers usually run into some of the tributaries which have a pebbly or rocky bottom.

Great numbers of these fish are caught by means of seines dragged along the sides of the streams. In the Unalakhlit River they are excessively abundant. To this stream the natives from the neighboring coast repair to prepare these fish for winter use. The fish are slit into two pieces, joined only by the tail, and then dried. The backbone is taken out, as the fish dries more rapidly and does not so soon become rancid. The backbones are also dried for dog-food. When dried thoroughly, the average weight is not more than a pound and a half, as the backbone and head are taken off.

This species was not observed among any of the Aleutian Islands. I was informed that it is taken in scanty numbers at irregular seasons at Unalashka and Attu. This fish remains sometimes in the rivers until the end of the year. They spawn about the 1st of August and have completed by the 10th. They return weak, and in most instances injured on the rocks, so that they are cast on the shore in great quantities.

The flesh of this species is not good. It is coarse and without a decided flavor. The color of the fresh flesh is light-reddish orange, the mature ova being still lighter. The exterior color of this fish is considerably lighter than *O. chouï'cha*, but of the same pattern.

The Russian name of this species is *Hoikó*. The Eskimo name at Saint Michael's is *Nŭk kŭk*.

101. ONCHORHYNCHUS NERKA (Walb.) Gill and Jordan.

This species arrives at Saint Michael's about the last days of July and remains until the first week in September. These fish prefer the smaller streams of the mainland and islands. They are caught in great numbers by means of seines. These seines are usually set across the stream, and when a sufficient number is caught below, the seine is drawn on shore and the fish thrown out of the seine as fast as the number of the fish will permit it. Hundreds at a time are caught by this means. The Eskimo also use a small dip-net and secure many of these fish by inserting it under the shelving banks, or between the rocky places, where they may have stopped to rest. Among the Aleutian Islands the small mountain streams, which form the outlet of a lake situated at the head of large ravines, are favorite places for these fish to ascend for spawning. The spawn is said to be placed among the fine gravel at the bottom of the deepest portions of the lakes. The fish ascend these streams at the high tides which occur toward the early morning, usually from 1 to 5 a. m. They play around the mouths of the streams for many days before entering. They enter slowly at first. In the course of a few days a sufficient number have arrived at the spawning places. They swim round and round the lake, seeking the best locality, and on the arrival of the greater part of the fish that will enter that place the fish begin to clear the mud, slime, and mossy accumulations off the pebbles which are at the place selected by them. The fish work industriously, turning over the gravel with their snouts, until a clean surface is presented on which to place their spawn. I had an opportunity to verify this at Attu Island in the latter part of August, 1880. The fish were observed shooting through the water of a lake near the village; and, on inquiry, I was informed that they were clearing their spawning-grounds. While clearing the area they root around among the gravel and mud, and when a sufficient space is upturned they swim rapidly over it, the motion of their body creating a current, which removes the loosely adherent particles of slime and mud which have settled on them, the result of the accumulations which have been washed down during the winter and spring months. The spawn is then deposited on the clean surface. The young fry do not leave the lakes until the following spring, or just before the adults arrive the following year.

About the 1st of May the Aleuts of Attu Island prepare the weir (*zapór* of the Russians) which obstructs the passage of the fish to the lake. A level place in the bed of the creek is selected where the banks are so high that in times of very high water it will flow over the top of the weir before it will undermine the place where the upper log of the weir is secured in the bank. Each head of a family and the young men contribute so much material in the shape of stakes of the requisite length, generally about 9 feet long and 3 inches in width by 2 inches in thickness. A long log is laid across the stream at a convenient height (about 5 feet above the bed of the stream). The stakes are then set slanting, with the lower end further up-stream. Large rocks are used to hold the stakes in position and to allow the water from above to pass through. After this is done the bed of the creek below the weir is cleared of all loose stones, so as to allow the net or hand-seine to be used in catching the fish, which collect below and cannot pass beyond.

Early in the morning the people visit the locality; and, if sufficient fish have collected during the night, all the people at the place assemble, and those most expert in using the seine stand some distance below the weir. The young boys and girls have gone into the water some distance below, and with shouts and beating the water the fish seek the shelter near the weir. Those holding the seine then enter and soon have all the fish secured. They are thrown on the bank and cleaned. The fish are owned in common; any one who desires to work can do so, those not so desiring will of course be remembered, in the winter, when the fish are to be distributed. After the fish are dried they are carried on the backs of the women and children to the principal village and stored, in October, in sea-lion stomachs for winter's food. The stomachs of these animals are very large, and when fresh are inflated with air and stretched as much as possible, sometimes having a capacity of over 35 gallons, or a little more than a barrel. These skins make a convenient receptacle for storing these fish, as they absorb just sufficient moisture to keep the contents in good con-

dition and also prevent mold from spoiling them. When food is scarce, the chief or some other selected person divides the supply of fish, giving to each person a stated quantity, so that each will get an equal share.

The fall of snow of the preceding winter has much to do with the summer's catch of fish at Attu. The streams are short and shallow, so that if sufficient snow has not fallen during the winter to feed the streams with water during summer the fish will not enter the creeks. The supply of these fish laid by at Attu for the winter of 1880–'81 was not over 1,200, for during the preceding year but little snow had fallen and but little rain in July and August of 1880. This same species is also caught at that place by means of a small seine about 120 feet long, off the mouths of the small streams as the fish are waiting for a favorable tide to help carry them over the small bars at the mouth of the creek. When the wind is blowing on shore the fish keep at some distance, but when blowing from the land the fish come into shallow water. The net is carried out by means of two canoes lashed together, or else from a small, open skinboat called a *bidará*. Two men row the boat, another puts the net out in the proper position, while those on shore hold to a rope by which it is gently drawn along the beach until the fish begin to show signs of being within the net. The boat is then rapidly taken to shore and the two ends slowly dragged out until the captured fish are drawn out. This manner of taking fish is practiced by all the Aleuts, while the traps across the streams are not used at all places on account of scarcity of wood. At Atkha and Unalashka seines or nets are mostly used.

The Aleuts in former times procured their fish in the same manner. At some places are traces of former superstitions concerning the fish streams. A man who was guilty of some crime against his fellows was not permitted to cross the stream during the fishing season. At Umnak Island women at certain periods are not, even at the present time, allowed to participate in the labor of catching the fish, for fear of polluting the stream.

The Alaska Commercial Company and the Western Fur and Trading Company have erected quite extensive packing works at Karlúk, on the northwest end of Kadiak Island, for salting their fish. During the season of 1881 over 3,000 barrels of these fish were put up for the California market. The workmen of the two companies used seines for catching the fish, and could catch as many as were possible to save when caught.

This species is called *Krásnaya rĕ'ba* in the Russian language, and *Nŭ'k kŭk* in the Eskimo language; and *A' nuk* by the Aleuts.

102. ONCORHYNCHUS KISUTCH (Walb.) Gill and Jordan.

This species arrives at Saint Michael's about the first of August and remains until the freezing of the fresh water in the latter part of October or early November. These fish are not so numerous at Saint Michael's as the species *nerka*, *keta*, or *gorbuscha*. They are larger than either of those species, and less in size than the *chavicha*. The average weight of this species will be not far from twenty-two pounds. They are darker colored exteriorly than the other species and have spots on the fins, upper sides, and head. These spots are dark chocolate in life, and soon become pale after death. They are procured in the same manner as the other species and are dried for food. The natives of the mainland do not consider this species as being particularly good. It is used principally for dog-food by the Eskimo. I have reason to believe that the more northern individuals of this species are not so good as those found farther south. They are quite plentiful among the Aleutian Islands. Here they are preserved by drying, salting, or drying for a few days, then salting very slightly and hanging in the smoke to finish drying. When prepared with care and smoked for several days with good hard wood (any other than spruce or cottonwood) they are fine eating. When fried these fish are very dry, and have a tendency to crumble to fine pieces while in the pan. The fibers of the meat do not hold together. This species is the last to arrive at the Aleutian Islands and remain until the snow covers the ground. The habits of this species are similar to those of the species *nerka* and *gorbuscha*, excepting that the spawn is laid among coarser gravel and stones along the banks of the creek and lakes. These fish tear up large areas of stones, and by rolling them about clean the slime and mud from the surface of the spawning-grounds. Even the banks of the lakes, where a gravel bed has previously formed, will be excavated so as to procure the necessary stones among which to deposit their spawn. The

snouts and fins of the fish are worn nearly off at the end of the season. The fish in the latter part of October and November are so exhausted that they then ascend the small branches of the principal streams and there wait their death. I have seen them with the end of the snout worn off past the muzzle and not a fin on them. At this season the native (Aleut) boys go early in the morning and catch these fish as they move in the deeper portions of the little streams—deeper than wide—which have cut through the ravines. The number of these fish at Atkha is considerably greater than at Attu and less than at Unalashka. I have seen individuals of this species caught as late as the middle of January. They are, after the middle of September, in poor condition and fit only for food during most pressing need.

The fish is a strong swimmer and very active, stemming the strong currents of the mountain streams with a rapid, zigzag course.

The eggs of this species are collected by the youngsters and put into the skin of the fish after all the flesh has been removed. This is as carefully saved as is the ukali made by the adults.

The Russian name of this species is *Kĕ'zooch.* The Aleuts call it *Ka ke' thakh.*

103. ONCHORYNCHUS GORBUSCHA (Walb.) Gill and Jordan.

This salmon is the smallest of all the species in this genus. They will not average over five pounds in weight. They are distinguishable at a glance by the arched back, which gives them the common name Hump-back or *Gorbū'sha* in the Russian language. This species arrives at Saint Michael's about the 25th of July and remains five weeks. They also prefer the smaller streams and in some places are to be counted only by hundreds of thousands. They appear at the surface of the water like the pin-drops of an April shower. Near the head of Norton Sound these fish are so abundant that the streams are choked with the struggling mass impelled by the calls of reproduction. These fish are obtained in the same manner as the other species. They are fat and when fried are next to the *chavi'cha* in flavor. The extremely old fish have a mealy substance at the base of the dorsal fin, beneath the skin, which has a tendency to make the meat dry. The belly is very fine, and in the earliest fish to arrive it is not to be surpassed as a pan piece.

This species has about the same habits as the *keta*, preferring, however, to deposit its spawn on the clean sand at the bottom of the lakes.

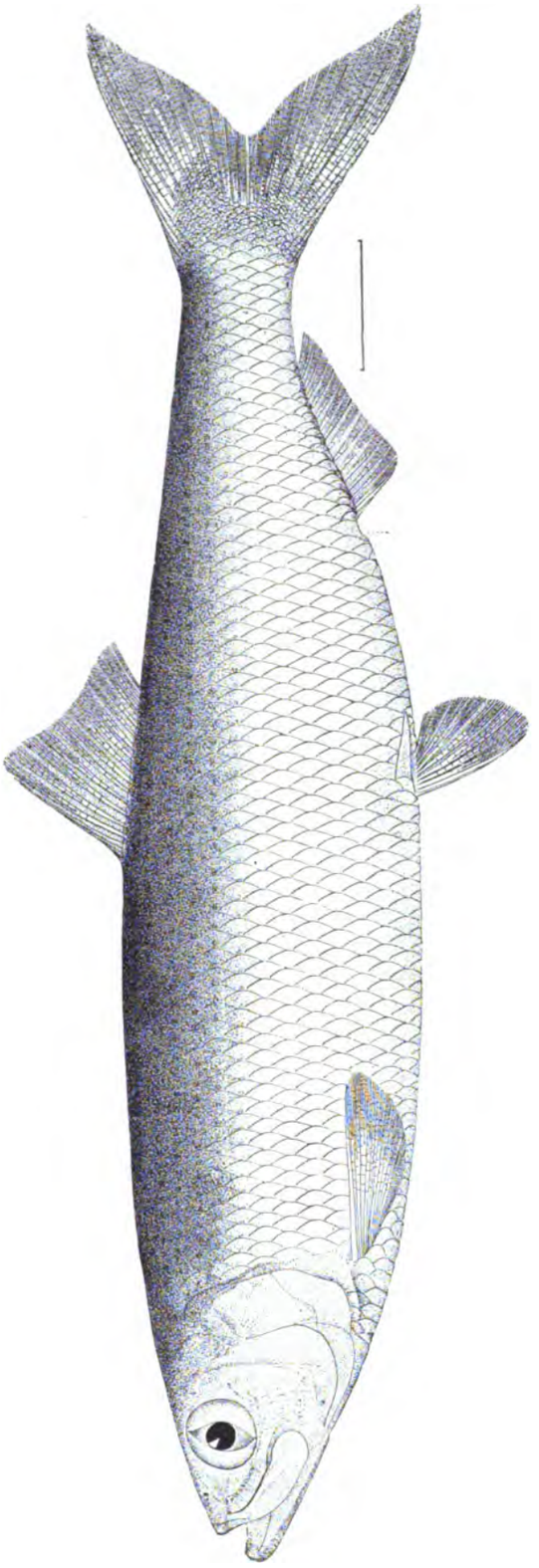
The exterior color of this species is much lighter than either of the others. The back is light plumbeous with silvery sides, the belly white. The fins are darker at the tips and lighter at the base, the dorsal and caudal are like the color of the back.

This fish makes a good article of ukali, but is apt to become very dry. Much other matter might be written in regard to the salmon of Alaska. The fishing interest is merely being awakened, and not until the supply nearer home is exhausted and the demand becomes greater will it be fully known what stores of fish are yet in Alaska awaiting the enterprise of the people to bring them to a market. The season is sufficiently long for any well-regulated cannery or packing establishment to procure all that could be taken care of. Native help is abundant and may be procured at a very reasonable rate, especially if supplies of tea, coffee, sugar, flour, and crackers are kept in store for the natives to draw upon while engaged in the season's work.

Several persons have attempted to establish works for preserving these fish, but have failed for lack of the requisite knowledge and, in some instances, insufficiency of capital. There is no doubt that thousands of barrels of salted salmon and the same number of cases of canned fish could be prepared in the summer season at the mouth of the Yukon. A vessel would have to take the supplies for each year in advance, as the fishing season would be half over before a vessel could arrive at the grounds, owing to the shifting of the channel. At the Nushagak and Ugasik Rivers, also, canneries could be profitably erected, and with a season of ten days longer than at the Yukon. At Kadiak but little has been done, though the day is not far distant when other establishments will be erected in that neighborhood. The fish already command a remunerative price in the San Francisco markets, and have only to be introduced to give an extended eastern demand for them.

The Aleuts give the name *Ath ga' yuk* to this salmon.

The relative values of the different species stand as follows, according to the opinion of those who have had opportunity to test the matter: first, the *chavi'cha*, then *gorbuscha*, *kisutch*, *keta*, and *nerka.*



CLUPEA MIRABILIS.

The natives have different opinions of their relative values. The Aleuts consider the cartilaginous nose and forehead of the *kisutch* to be the best of food when fresh. I have seen the entire family seated on the parlor floor with a *kisutch* before each member, who was industriously stripping that portion off the head and devouring it. The heads make a rich soup which is highly praised by some of the white people. The belly of the *chavi'cha* is usually cut from the body of the large fish and salted as a separate piece. This is the finest of all salted fish. It is very fat and has a taste that once partaken of is rarely forgotten. When freshened and dressed with spices and vinegar it is a tempting dish. The Russians make a kind of pastry of salmon-bellies, rice, eggs and such other things as may be at hand. When prepared in good style it is very nice, but when it has a few shreds of Attu garlic in it it is better to let it alone if you expect to entertain friends during the next several days.

CLUPEIDÆ.

106. CLUPEA MIRABILIS Girard. (See Fig. XIV.)

The herring arrives at Saint Michael's about the 10th of June and remains ten to twelve days. It is extremely abundant, swimming in large schools near the shore; seeking localities where seaweeds abound on which to deposit its spawn.

The natives use seines with meshes of two inches across for these fish and catch them by the ton. They are eviscerated and dried for food. Among the Aleutian Islands this species is wonderfully abundant. At Unalashka they are plentiful in the latter part of July and again in September, though the second appearance of the fish is not always certain in this locality. The Aleuts of Unalashka catch thousands of these fish in seines. I knew one haul of a seine, about 75 feet long, to successfully land 3,600 of these fish at Immŭgné cove, near Iliuliuk village, on Unalashka Island.

At Atkha Island they are excessively abundant in Old Harbor, on the northeast side of the island. The Atkhan people preserve large numbers of these fish by drying them. I do not know that they occur at Attu Island; for during the two seasons that I was there, none put in an appearance, and as the natives did not speak of them I am led to conclude they do not visit that island. All along the south side of Aliaska and the Kadiak district these fish are plentiful. Their range is comprised between the southern coast of California and Bering's Strait.

The herring of the Aleutian Islands are larger than those of the Saint Michael's district and possess a decidedly superior flavor.

The Russian name of this fish is *Selld;* the Eskimo name is I *káth loo ŭ'k pŭk;* the Aleutian name for the herring is *U'l ngan.*

RAIIDÆ.

113. RAIA PARMIFERA Bean.

This Ray is abundant at some localities among the Aleutian Islands. Toward evening, when the tide is high, these queer-looking objects come near the water's edge to seek the offal, which may have been thrown on the beach after the fish caught during the day have been cleaned. The Rays appear to forget that the tide in the ocean has an ebb as well as a flood, for numbers are left on the beach by the receding tide. Early in the morning in January, February, March, and the early part of April great numbers are left on the beach. They seem to make no struggle to get back in the water, as the sand under them is apparently undisturbed where they lie with their heads toward the point from which the wind was blowing at the time. When a hard wind-storm is commencing these Rays may be seen sporting at the surface of the water like flashes of light or small white-caps just breaking; dozens at a time may be seen. There is no use made of the flesh. The Aleuts look with disgust upon these fish. The color of the fish is about that of dressed sole-leather on the back and white underneath, with pinkish patches near the nose and anus.

I have never seen this species west of Unalashka, though it doubtless occurs throughout at least the eastern islands of the chain.

At Saint Michael's it is very rare; only a few individuals were known to the natives. This species attains a great size, often three feet long and two feet wide. This and one of the large Sculpins (Cottus) are the most disgusting inhabitants of that part of the sea.

Their food is composed of anything that may come in the way. The mouth is capable of being projected three or more inches and is sufficient in power when projected to cause the hand to receive a smart blow.

The Russian-speaking people call the Rays *Morskoi Chika*, or Sea-gulls.

PETROMYZONTIDÆ.

116. AMMOCŒTES AUREUS Bean. (See Fig. XV.)

This species of Lamprey ascends the Yukon River in the latter part of December of each year They are so abundant that figures fail to express an adequate idea of their numbers. They swim in large schools toward their spawning place, which is yet undetermined. They are not rapid in their movements, so that by the middle of February they have ascended only about 250 miles up the river. By that time they have arrived at Anvik and Mission on the Yukon, and by the latter part of April they have arrived at Fort Yukon, over 1,000 miles from the mouth of the river. The season at any given place is about three weeks.

At Mission and Anvik the natives, who are on the watch for their coming, cut a narrow piece of ice out of the river, and in a direction across the current where the fish are ascending. A long stick, having several twigs or forks left on it, is used to obtain these fish. The native then thrusts it into the water, and with a quick lift throws out dozens of these fish at a time. In a couple of hours an industrious native will have caught a wagon-load of them. The fish are thrown into piles and are left to freeze as they fall. So long as the ice in the river lasts the pile of fish is secure, as it is frozen so hard that nothing affects it. When the fish are wanted for food a chunk is picked off and taken to the huts. The fish are very fat. The oil is readily boiled out, and is said to have a pleasant taste, though a rather rank smell. I am not aware that this species is found anywhere else than in the Yukon River.

The color of the fish is yellowish olive on the back, becoming lighter on sides and dull sulphur-yellow on abdomen and lower side of head. The lower parts posterior to the anus are like the color of the sides.

The Russian name of this species is *Menoga*, meaning Lamprey. As this species does not occur in the vicinity of Saint Michael's, I could not learn any name for it in the Eskimo language. These people only know of the fish by its being obtained from the Yukon.

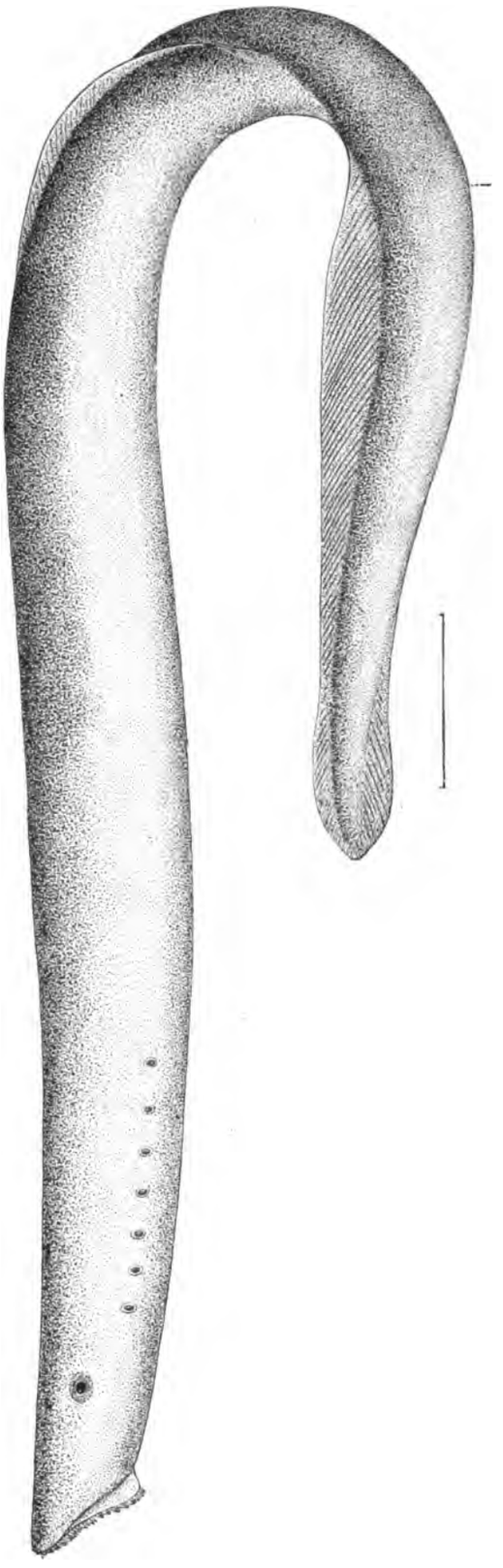
SCYMNIDÆ.

95 (of Appendix). SOMNIOSUS MICROCEPHALUS (Bloch) Gill.

On the 28th of November, 1874, a trader was visiting some fox-traps a few miles above Saint Michael's. His attention was directed to the dogs which accompanied him, sniffing the air, and running to the shore under a high bluff where they found a dead Shark which had apparently been lying there several days, and was probably stranded there previous to the bay having been frozen over on the 19th of that month. I was informed of it, and went with him to the place. In the mean time he had set several fox-traps near the carcass, as the foxes attracted by the food had visited it in great numbers. On arriving at the place he told me to look out for traps. Just at that instant a setter dog stepped into one of the traps. The fright made the dog jump so high that she struck him, and nearly knocked him down. After releasing the dog, we pried the Shark out from between the rocks and shore-ice. It measured seven feet nine inches in length, and weighed 340 pounds. A portion was taken to the redoubt, where it was used as dog food, the dogs having no dislike for the meat.

A second specimen was cast up by the sea near the village of *Áthwik*, or Stebbins, on the western side of the island of Saint Michael's, in November, 1876. These two individuals were the only ones ever known to occur in that vicinity, as the natives had never seen or heard of them previous to the appearance of the first one.

A large species of Shark (*Squalus acanthias Linné*) occurs in the neighborhood of Karluk on the north western side of Kadiak Island. It comes there in large schools, sometimes numbering thirty to fifty, to obtain the salmon which are entering the small river at that point. The natives engaged in helping preserve salmon for the fishing stations there generally take a calm day and hunt



AMMOCŒTES AUREUS.

these Sharks with harpoons. After being struck and tired out the fish is dispatched with a lance, driven through the heart. The livers are taken out and the oil allowed to drain from them and used as food, and is considered quite a prize by those people. The season for the arrival of that Shark at Karluk is from the 18th of July to the 25th, and it remains only a few days. I saw the bodies of over a dozen individuals from which the livers had been taken. The liver is very large and will yield a considerable quantity of oil.

At Atkha Island I saw a large Shark swimming, with its black fin out of water, in Nazan Bay, in the latter part of June, 1879. I fired several shots into it, but failed to get it. This species was doubtless different from the one seen at Karluk, and totally distinct from the one at the head of this article. Unfortunately I had not the means of preserving large fish, so had, in several instances, to let desirable fishes be passed by.

OCTOPUS PUNCTATUS Gabb.

This creature is distributed in great abundance throughout the southern and eastern part of the coast line. It is not plentiful north of the Aleutian Islands, but among them is extremely plentiful. The natives assert that it was common in Unalashka previous to 1867, but an earthquake caused them to leave the neighborhood of Iliuliuk village. Of late years they are beginning to reappear. At this place they do not attain a very great size, seldom over three to five feet in expanse of arms. At the islands west of the islands of the Four Craters this species is found in great numbers, and in some localities attains a great size, some individuals being over 10 feet in expanse of outstretched arms. At Kiska Island the largest individuals occur, though but little larger than those of Attu.

They frequent the shallower parts of the flat-topped reefs of rocks and rocky shoals at the entrances to harbors and between islets.

They are generally drawn up in a crevice of the rock, awaiting an unlucky fish to pass within reach, when the arms are thrown out with lightning-like rapidity, and seizing the victim it is slowly drawn toward the body and devoured. The animal then remains very sluggish for some time. The natives also find them where the receding tide has left them in a crevice of the rocks. The animal is said at this time to be easily frightened and will run over the beach to the water with astonishing rapidity. The natives catch them with a hooked gaff, which is carefully placed under the animal when it is discovered in the shallow water. By a quick jerk the animal is withdrawn before the disks have an opportunity to grasp the surface of the rocks. The flesh is used as food, either in a raw condition or boiled. It is considered very fine eating. When going out on a fishing party the people are generally successful if a "Rak" (Russian name) is secured for bait. Fish of all kinds, which will bite at the hook, eagerly seize this food. Again, the fisherman often pulls up a fish and to it is attached an Octopus which has seized it as it was dragged near its retreat. It oftentimes seizes the bait of the fisherman and is brought to the surface. It is very difficult to manage a large individual, as the arms are pulling and thrashing in every direction. The native endeavors to seize the animal just behind the head, where a slight squeeze will instantly kill it. The women are very expert in this, and will frequently kill those of such size that the men will hesitate to struggle with.

The gall of this animal is dried and used as an article of paint for canoe-paddles, and ornamental stripes on their garments. The gall is of an india-ink color; has a lustrous fracture, and is prepared as a pigment by pounding, or grinding, it on a flat stone with a little water. It is applied with the hand and well rubbed in. After an hour or so the painted surface is carefully oiled with seal or other animal oil, and held over a fire to allow it to be absorbed. It then turns a dark slaty black, and is extremely durable.

This animal is so abundant that it could be made available as a supply of bait to be used in catching cod and other fish.

PART V.—BIRDS.

[The number preceding the name corresponds to the number in the A. O. U. Check-list of 1886.]

2. COLYMBUS HOLBŒLLII (Reinh.). *Holbœll's Grebe.*

This Grebe is not common in any part of the territory. A single specimen was brought to me from the Kuskokvim River, September 10, 1876, by Mr. J. W. Clark, who informed me that this species was extremely rare in that locality. It frequents the lakes and tide lagoons.

Two specimens were obtained at Unalashka Island. In this locality they are to be found only in the winter season, and are not at all common.

The iris is black; bill, greenish-horn; dusky on culmen and tomial edges; tip of upper mandible, black; lower, greenish; feet, greenish with edges of scales darkened; tips of toes dark; inner edges of lobes dark; claws light-edged; a male, No. 197, from Unalashka, December 17, 1878. Another specimen, from the same locality, has the bill dark on base of culmen and region of nostril, otherwise yellow; feet greenish-yellow with darker lines through centers of scales, while the scales themselves are edged with brilliant yellow.

Several specimens of Grebes were observed among the Aleutian Islands, but it was beyond my power to obtain them. The Eskimo name of this Grebe is *Ta tá tŭk*, from its note *ta-ta-ta*.

3. COLYMBUS AURITUS Linn. *Horned Grebe.*

This Grebe is occasionally seen in the neighborhood of Saint Michael's; more often in spring or fall. In the interior of the Yukon District it is common, especially along the tributaries of the Yukon. At Nulato and Fort Yukon it is said to breed; although, I do not think it does along the coast in the vicinity of Saint Michael's.

Among the Aleutian Islands it is to be found in the winter. I did not observe it there in the summer and at no time to the westward of Unalashka Island.

This species prefers the fresh bodies of water, and only resorts to the bays and estuaries when the fresh water is frozen. The nesting habits of this species were not learned by me.

The iris of the species is yellow, culmen black, rest of bill bright yellow, outer side of tarsus and under side of web blackish; inner side of tarsus, toes, and lobes bright yellow, with faint greenish tinge; claws dark.

The native who brought me a specimen of this bird had no name for it, and declared it was the first he had seen.

At Attu Island I observed a Grebe, which I suspected was this species. It was so shy that near approach was impossible.

7. URINATOR IMBER (Gunn.). *Loon.*

This Loon occurs but sparingly, according to my own experience, along the Alaskan shores. I saw three individuals at once in the vicinity of Cape Newenham, and occasionally an individual in the vicinity of Saint Michael's. I failed to secure specimens of it for preservation.

8. URINATOR ADAMSII (Gray). *Yellow-billed Loon.*

This Loon occurs sparingly in the vicinity of Saint Michael's.

The only specimen seen by me, that I could certainly identify as this species, was killed by a native. A press of other work caused me to delay preparing the skin until it was too late.

9. URINATOR ARCTICUS (Linn.). *Black-throated Loon.*

The Black-throated Loon is quite common at Saint Michael's, where it arrives by the middle of May. As soon as the sea-ice is moved these birds resort to the sea, rarely far from land. During the breeding season they retire to the smaller lakes, whose margins are hedged with a growth of rankest grass. A nest was known to be in a pond some distance from the Redoubt. I went there to obtain the eggs. The parent was sitting in the pond and would not fly, but dove and swam round in the water and seemed much distressed by our presence. Several shots were fired into her before she was killed. They are extremely tenacious of life; and when they are killed it is only after the body is riddled with shot.

These birds are to be found among the Aleutian Islands at any season of the year. At Amchitka Island a pair frequently were seen in the bay, during the month of June, but always just out of range for a shot.

They would swim up and down the bay for half a mile and return by the same course. A native boy finally shot one of them, unknown to me until after he had plucked the feathers from the body. The Aleuts value the flesh very highly, but admit that it is tough.

Many years ago the natives of Saint Michael's vicinity made use of the skins of this species for a number of purposes. I have seen them converted into a sort of work-bag; in which small, but valuable tools were kept. The skin in such a case is cut down the back and the flesh removed. The skin is then dried by being worn on the head of the person owning it. Another purpose for which it is used is to form a receptacle for the bunch of fine shavings which are tied together and serve as a flesh-brush while taking a bath; and, for this reason, it is just as well to ask what is in it before investigating its contents on your own account, as these people have but little soap and employ something else in lieu of it.

On the Lower Yukon River is a village called by the Russians *Gagara Shapka*, and means Loon Cap, on account of the natives wearing the skins of these birds as caps.

The Eskimo name of this species is *Tu ĕ lŭk*, and is derived from the note *too-e-e*—a most dismal sound heard in the stillness of the night.

10. URINATOR PACIFICUS (Lawr.). *Pacific Loon.*

A single specimen of this Diver was obtained August 25, 1876, at Saint Michael's. It is not common, and was not recognized to a certainty at any other time. This specimen was an adult female and had just passed the breeding season. Where, or how, this bird breeds is unknown to me.

This species was observed in Chichagof Harbor, Attu Island, in the winter of 1880–'81. I did not observe them there at any other season of the year in the vicinity of Attu; yet they breed in considerable numbers on the low grounds of Semichi.

11. URINATOR LUMME (Gunn.). *Red-throated Loon.*

The Red-throated Diver is quite abundant throughout the Territory. It is common among the tributaries of the Yukon River.

This Diver arrives by the 20th of May, and immediately repairs to the lagoons and grassy lakes where it breeds. It remains until late in September.

They obtain much of their food from the sea. They consume small fish, which they obtain by diving. They are very watchful and rely more on their ability to escape danger by diving than by flying. When about to dive they draw the head and neck back, throw the body forward with a plunge, or else, when surprised, they quietly sink in the water in such manner as to leave scarcely a ripple on the surface.

Among the Aleutian Islands this species is quite abundant. It breeds in nearly all the islands of the chain. At Atkha several pairs were known to breed among the lakes on the highest hills.

Several young of this bird were brought to me, while at Atkha in 1879, but want of time, when I received them, caused me to put them in an out-building. The next day I went to look for them, and found that the rats had carried them off during the night.

When the young birds are not yet able to accompany the parents the latter feed them on small fish fry from the sea. A pair which had nested a couple of miles back of the village at

Nazan Bay, on Atkha Island, attracted my attention early every morning by their harsh, cackling notes as the parent flew toward the bay to obtain food. I endeavored to discover whence the parent came, and posted myself near the track it usually flew, but the intervening hills prevented me from detecting the locality. I could not but observe the regularity with which the morning visit was made to the bay. It never varied ten minutes from 8 o'clock a. m.

The flesh of this bird is considered palatable by many of the Aleuts and most of the people near Saint Michael's.

This species remains among the Aleutian Islands the entire year, but less in winter than in summer.

Quite a number of these Loons breed on Semichi and Agattu, of the Nearer Group.

12. LUNDA CIRHATA Pall. *Tufted Puffin.*

The Tufted Puffin is common in the neighborhood of Saint Michael's, though here not more than one-third in number compared with *F. corniculata.* At some of the localities south of the Kavyáyak Peninsula these birds abound. On the outer side of Whale Island, near Saint Michael's, they are more plentiful than elsewhere in the immediate vicinity of Saint Michael's. A number of pairs breed on the little round island just outside of Whale Island, to the right of the entrance to Saint Michael's. A few also breed on Egg Island, to the northward of the entrance to the harbor. At Cape Newenham but few of these birds were seen in comparison to the number of *F. corniculata*, with which they are generally associated. Along the northern shores of the Aliaskan Peninsula they were seen in considerable numbers, as they were also at the Pribylof Group, Saint Matthew's and Saint Lawrence Islands. Among the Aleutian Islands, and on the south side of Aliaska, with adjacent islands, these Puffins are found in great numbers. Some of the islands afford better locations for breeding, and these are resorted to by incredible numbers of these birds. Their food consists of mollusks and other marine food, such as small fish.

The nesting habits of this Puffin resemble those of the Horned Puffin. My own observations show that the former prefer the cliffs and edges of bluffs overgrown with grass, which has made an accumulation of soil on the tops and edges of some bluffs to a depth of several feet. This soil is a perfect network of holes and burrows of these birds. That species of grass usually grows in large tussocks, and the falling stalks and blades, overlapping the other tussocks, form a convenient retreat for these birds, and doubtless the grass is of ranker growth, due to the excrement of these birds coming almost in contact with the grass roots. It is not without danger to attempt to walk among these tussocks, as their roots are not strong, for the least misstep would precipitate the person many feet below.

The nest is usually the bare earth, whereon a single egg is laid. The young take to the water before being able to fly. The parent bird assists the young to the water.

The adult bird may be found many miles from land. They probably visit certain localities far off in search of food.

During perfectly calm weather they experience great difficulty in rising from the water, but will flop and kick along the surface for many rods and suddenly drop. When alighting on the water they usually dive under the surface for a few feet. They are expert divers, and when wounded are difficult to obtain until life is extinct. They are extremely vicious when caught, and with their powerful jaws they can inflict a severe wound, not relaxing their hold until the beak is pried apart. Their claws are extremely sharp, and scratch deeply into the hand, inflicting painful wounds. The skin of this bird is very tough; and, as the plumage is nearly uniform in color, these Puffins are much sought for by the natives, who use their skins to convert into articles of clothing.

While the natives are on the summer hunt for sea-otters they improve the days unfavorable for that pursuit in visiting the breeding localities of the Tufted and Horned Puffins, to catch them for their skins. The hand is usually protected with a leathern glove of seal-skin, or else a coat sleeve is wrapped around on the hand. The bird makes little attempt to avoid capture, but holds by the beak to the person, and uses its feet to best advantage. The natives endeavor to catch the bird by the wing, as the claws are then used to retard the bird being withdrawn from its crevice or hole, and, besides, in the struggle, if the bird should be taken by the body the feathers might be pulled out.

As soon as the bird is captured the native either breaks the small of the bird's back, or else bites it in the head. This latter method is preferred for killing all kinds of large birds, and is more practiced by the Aleuts, while the northern people break the back of the bird. When the native returns home with a sufficient number of birds for his own and family necessity, the labor of taking out the flesh begins. The beak is cut off just at the edge of the feathers, the meat, bones, and everything else inside of the skin must come out at that hole. The wings are carefully drawn until the humerus can be dislocated from the body. The wing is then cut off. The skin is now turned inside out and the larger, adherent particles of flesh and fat are removed. The skins are then hung up to dry until the severe weather of winter compels the women to remain within doors. A certain liquid has been saved up for a considerable time until it acquires a intolerable odor. The skins are then soaked in this liquid until the oiliness and fatty parts are removed from the skins, and if the person is able to purchase soap the skins are then washed in a strong suds. If not washed in soapy water it matters little, as the greater part of the odor is removed by washing in some convenient creek until the person is tired, which occurs before long engaged. The skins are then hung up to dry. After that the skins are carefully scraped; and the tougher parts chewed between the teeth to make them pliable. An Aleut woman will go on a visit to a neighbor to have a *Chy peet*, or tea-party; in the intervals of drink and gossip a bird-skin will be drawn from beneath the folds of her garment; and, she will then as complacently chew the skin as one of our country dames will draw out her knitting and pipe to while away the time.

The number of skins used for a *parka*, or long gown-like garment, with or without a hood, is variable, according to the size and height of the wearer. A common-sized man requires the skins of forty-five birds of the Puffin kind. The women and children require less. Forty-five skins are usually bundled together and rated as one parka.

The parka is worn with the feathers inside; and, when the garment is new, makes the wearer quite conspicuous. The skins are cut down the back, leaving a straight edge, to which another is sewed until the required length is obtained. On the edge of this strip another strip is added. This will be heavy and inconvenient in sewing, so another pair of strips are sewed together until the desired height of the garment is obtained. The arm pieces are made separately, and are the last to be sewed on. The edges of the collar and sleeve are bound with cloth to prevent tearing. The flesh side of the skin is then ornamented with stripes of paint of various colors, such as vermilion, green, blue, or black. Before the introduction of dry paints the natives used various colored rocks, which they powdered up and mixed with blood of the raven or other land-bird, and applied it for ornamental purposes. A parka is expected to last for two years; but, in the soot-begrimed houses, it soon becomes a receptacle for all dirt. The parka may be washed in water occasionally; and, I believe this is only done when it becomes so infested with vermin that the owner is afraid to put it down for fear it will walk off. A washed parka of nearly two years old is a sorry-looking object. The long feathers are by that time mostly fallen off. A few patches of down and skin are about all that remain.

Before the advent of the Russians and the introduction of civilized clothing this parka was the only garment worn by the Aleuts, and is now quite extensively used by the Attu men and women.

14. FRATERCULA CORNICULATA (Naum.). *Horned Puffin.*

The Horned Puffin is abundant on all the shore line of Alaska south of the Arctic circle; and, in favored localities it abounds in incredible numbers. Their favorite resorts on land are the high, precipitous walls of rock, which face the sea, or else the small islets which have their bases composed of immense blocks of rocks thrown irregularly together.

At Saint Michael's Island there are but few places affording suitable locations for them. On Whale, Stewart's and Round Island, in that neighborhood, the abrupt nature of their outlines form convenient harbors for this bird; hence they frequent those places in considerable numbers.

At Cape Newenham, on the northern side of Bristol Bay, I saw these birds in countless thousands in June, 1878. They were constantly flying from the sea to the higher parts of that bold cape. A few days after I saw them quite as plentifully in toward the head of Túgiak Bay. Later in that month I saw them in thousands near Amák Island, just north of the western end of the Penin-

sula of Aliaska. This is the beginning of the area of their greatest abundance. All the Aleutian Islands, with their adjacent islets, form an east and west extension of a continuous breeding ground of these birds for over a thousand miles in length. The Pribylof Group, Saint Mathew's Island and Saint Lawrence Island are also great breeding places of these Puffins.

Their nests are placed on the ledges of the highest cliffs of those islands where foxes are found, and on islands where foxes are not found these birds breed generally at the bases of bluffs, under the large rocks which have become detached and fallen down. Their nest is composed of just whatever happens to be there, be it sticks, stones, or earth. A few feathers may be dropped from the bird, but not for an evident purpose of nest construction. A single egg of clear white color is laid on the bare gravel or earth. The egg is very large for the size of the bird, and when cooked is tolerable eating. The bird sits long at a time on the egg, and does not leave it until hunger compels her to seek food. Their food is composed of mollusks of various kinds, a few shreds of certain sea-weed fronds, and larvæ, which are abundant on some of these sea-weeds.

The young leave the nest before being able to fly. The parent assists them to the water; and, should they have been reared on the face of a high bluff, the old bird catches the young one by the wing and they flutter at a long angle to the water. The old bird endeavors to keep under the young one. I have seen them drop their young accidentally and cause great consternation of the parent, which could not check her flight immediately, but returned and showed great solicitude by turning the young one over and over in the water to see if it was injured. During severe storms the young are taken to the lee of some reef or islet until the waves become quiet.

Early in the morning these birds quit the shores and go out to sea to hunt their food. Late in the afternoon they return. For several hours these birds keep a constant stream on the way. They frequently go many miles from land, and should a fog prevail they return with unerring certainty to their particular locality. This Puffin is constantly associated with *L. cirrhata*, and, in general habits, agree with it, though the former is more difficult to obtain. The skins of this bird are used to a great extent in making articles of clothing for some of the western Aleuts and some of the natives near the Yukon Delta and southward.

The Eskimo name of this Puffin is *Ka tŭ'kh pŭk*, and signifies Big white-breast.

16. PTYCHORAMPHUS ALEUTICUS (Pall.). *Cassin's Auklet.*

A specimen of this Auklet was obtained at Atkha Island, June 23, 1879. The bird was brought by a fisherman who lives at Old Harbor, on the northeast end of Atkha Island. He reported this species to be not abundant, yet common and breeding there.

17. CYCLORRHYNCHUS PSITTACULUS (Pall.). *Paroquet Auklet.*

No specimen of this Auklet was obtained or seen at Saint Michael's. Among the Aleutian Islands it is abundant, and breeds in all suitable places along the chain. It is not sociable, being rarely seen in flocks of more than three or four, and more often solitary.

This species is more abundant among the central portions of the Aleutian chain than elsewhere, and is plentiful on Agattu Island; rare on the other islands of that group, though not resident.

18. SIMORHYNCHUS CRISTATELLUS (Pall.). *Crested Auklet.*

The Crested Auklet was observed on two occasions at Saint Michael's. It is very rare in that immediate vicinity, though it doubtless occurs in other localities near that place.

At Bristol Bay and on the northern side of Aliaska I saw numbers of these birds.

Among the Aleutian Islands this Auk is extremely abundant. They resort to the outlying islets and rocks away from the larger bodies of land.

I failed to obtain their eggs, for the reason that the nest is placed far under huge rocks, or in the deep, inaccessible crevices.

This species remains, in few numbers, among the waters surrounding the Aleutian Islands, but in the summer season is greatly more numerous, especially so among the more western islands.

The iris is white, feet dusky, bill crimson with a horn-blue tip. The colors of the bill become intensified upon drying.

12.)

Least Auklet.

while I was on the sealing vessel travelling from one

Island,

In 1874 I observed it

This bird does not come near the

They are very active while on the water and disappear like a flash when they dive.

Atkha I observed quite a number of these little birds sitting on the water.

Synthliboramphus antiquus (Gmelin). *Ancient Murrelet.*

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(Brandt). *Pallas's Murrelet.* [See Plate II.]

Guillemot was obtained April 24 1879, at Igaliuk village on

SIMORHYNCHUS PYGMÆUS (GMEL.) ADULT, BREEDING PLUMAGE.

The note of this bird is a peculiar grunt of two or three syllables. It is impossible to represent the sound by any combination of letters.

In former years when the Aleuts of one village or island made war on their neighbors the early morning notes of this bird indicated to the people the time of day for making an attack.

The Eskimo of Norton Sound use the red processes at the base of the bill of this bird to attach to the fish-lines to attract the fish.

19. SIMORHYNCHUS PYGMÆUS (Gmel.). *Whiskered Auklet.* [See Plate I.]

Three specimens of this Auklet were obtained at Atkha Island, June 12, 1879. Two of them were adult males in the breeding plumage and one in the downy stage.

They were brought to me by a native, who had killed them near the base of Korovinsky volcano.

They were reported to be common in that neighborhood.

I saw several individuals near the outer islet at the entrance to Nazan Bay, on Atkha Island. They were not recognized in any other part of the Aleutian Chain, excepting on the Nearer Group, where they were quite abundant.

The summer plumage of the adult male is dark slate on head, nape, back, and wings. The shoulders have an obscure bronzy shade, the tip of the wings becoming lighter. The throat is a little lighter than the head and fades to light grayish on the abdomen. The tuft on the head consists of five to seven filamentous feathers, of color of head, curved forward so that their tips hang directly over the tip of the bill. These feathers, which form the tuft, become lighter in color according to age of the individual. In front of the eye and above the angle of the mouth three filamentous feathers of pure white point directly backward. These form the upper angle of a V-shaped white patch, which has its forward angle beginning at the base of the upper mandible. The other branch continues back of the rictus and terminates in white filaments, which extend back the same distance as the terminal filaments of the upper branch. Behind the eye is a white narrow stripe, consisting of several very long, white filaments, the longer of which extend about half an inch beyond the shoulders when the bird is sitting on the water.

The young in the downy stage is of dark, sooty-brown, somewhat lighter on the abdomen.

In the adult the bill is deep vermilion, with bluish tip. The feet, toes, web and claws dark. Iris black. In the young the bill and feet are dusky.

20. SIMORHYNCHUS PUSILLUS (Pall.). *Least Auklet.*

Many individuals of this Auklet were seen while I was on a sailing vessel travelling from one place to another among the Aleutian Islands. This species occurs along the entire chain, and as far east as Kadiak. On the north side of Aliaska I observed it only in the vicinity of Amák Island, near the western end of the peninsula of Aliaska.

In 1874 I observed it in abundance near Saint Mathew's Island.

This bird does not come near the present settlements on the Aleutian Islands, while at Saint George's Island, of the Pribylof Group, it is wonderfully abundant almost in the village.

They are very active while on the water, and disappear like a flash when they dive. Near Semichi and Atkha I observed quite a number of these little birds sitting on the water.

21. SYNTHLIBORHAMPHUS ANTIQUUS (Gmel.). *Ancient Murrelet.*

A single specimen of this bird was obtained at Atkha Island, June 12, 1879. It was brought to me by a native, who had shot it at the base of Korovinsky volcano, on the northeast end of Atkha Island.

Upon inquiry I was informed that these birds are plentiful in that locality, and breed in holes made in the turf, or sod, overhanging the brow of the cliffs.

Among the Nearer Islands this Murrelet is abundant in summer, breeding, and is sparingly resident; rarely coming to Attu, but more plentiful on the western end of Semichi and the south side of Agattu.

24. BRACHYRAMPHUS KITTLITZII (Brandt). *Kittlitz's Guillemot.* [See Plate II.]

A single specimen of Kittlitz's Guillemot was obtained April 24, 1879, at Iliúliuk village on

SIMORHYNCHUS PYGMÆUS (GMELIN)

SIMORHYNCHUS PYGMÆUS (Gmel.) Adult, Breeding Plumage.

GILES LITHO & LIBERTY PRINTING CO. N.Y.

BRACHYRAMPHUS KITTLITZII (BRANDT). ADULT, WINTER PLUMAGE.

Unalashka Island. It was the only one seen in that locality. The native who brought it to me asserted that this species is abundant throughout the year at Sannakh Island. They breed there, laying a single, pure white egg. The nest is placed among the roots of the large tussocks of grass on the edges of bluffs and cliff ledges.

I observed several of these birds to the westward of Unalashka Island. They are not rare on Amchitka Island, and in the neighborhood of the Old Harbor, on Atkha Island.

The specimen obtained by me was in the winter plumage of the following pattern:

Forehead, top and back of head dark plumbeous, back, rump, and upper tail-coverts plumbeous. The feathers of the middle back and whole of the rump tipped very narrowly with white. Tail dusky, tipped narrowly with white. Wings dusky slate. Secondaries and greater coverts narrowly tipped with white. Scapulars chiefly white, forming a broad, longitudinal stripe. A narrow, white collar round hind neck scarcely interrupted in middle portion. A broad, transverse space of uniform slate color on each side of breast, separated by less than an inch of white between them. Lores, superciliary and supra-auricular regions, with rest of head and neck and entire lower parts, pure white.

Bill black, feet weak, pale blue in front and darker posteriorly. Claws and iris black.

The following measurements were taken. Length, 9.75; wing, 5.15; bill, 4; rictus, 1; tarsus, 5; middle toe, 95. A comparison of this species with that of *B. marmoratus* shows the winter plumage of the latter to be: Forehead, sides, top and back of head dusty slate; back and rump plumbeous, each feather of the back narrowly tipped with white; tail, slate; wings, dark slate, the remiges decidedly darker. The secondaries and greater coverts tipped with a narrow edge of white. Scapulars white, forming a broad longitudinal stripe. Beneath pure white. White collar interrupted, for nearly half an inch, on back of neck. Measurements show: Length, 10.2; wing, 4 9; bill, .8; rictus, 1.3; tarsus, .78; middle toe, 1.1.

28. CEPPHUS MANDTII (Licht.). *Mandt's Guillemot.*

The Black Guillemot occurs rarely at Saint Michael's; only two specimens were obtained there. One of them was shot February 1, 1875, after a severe storm had moved the ice.

It was obtained by a native, who shot it as it sat in a crevice of the ice. It was in the winter plumage. The second specimen was obtained late in March of 1875, far out at sea beyond Stewart's Island, and procured also by a native, who was out sealing.

I know nothing of the general habits of this bird. It was not observed at any other place along the coast, or on the Aleutian Islands.

The bill and iris are black, mouth crimson, feet red.

29. CEPPHUS COLUMBA (Pall.). *Pigeon Guillemot.*

This Guillemot occurs sparingly in the vicinity of Saint Michael's. Around the northeast end of the island of Saint Michael's and near Whale Island a few may be seen after the ice has left the shores. It breeds on the little islet near Whale Island. I could not obtain the eggs, because they were too far under the huge blocks of stone at its base.

At Cape Newenham I observed numbers of these birds in June, 1878.

This species is abundant at some of the Aleutian Islands. It frequents the small islets off shore and is rather shy, permitting no reasonable approach. The only way I could obtain them was to watch from the top of some bluff and shoot them as they sat below. They utter only one note, a sharp, ringing *tweeet.* When sitting on the water they ride buoyantly, and rise without difficulty. This species is not abundant at the extreme western Aleutian Islands; but few were seen at Attu, though in the neighborhood of Agattu and the Semichi Islands they are more plentiful, and not observed in winter. On the south side of Aliaska, and adjacent islands, I saw numbers of these birds.

Off to the north of Umnak Island, about twenty miles distant, lies the recently upheaved island, named Bogoslov; here I saw thousands of these Guillemots in 1881, as I passed it. The island seemed to be one of the principal breeding grounds of this species, as they were here in such numbers in June.

The mouth and feet of this bird are bright red; claws, bill, and iris black. The Eskimo name of this Guillemot is *Ti tŭk.*

30*a*. URIA TROILE CALIFORNICA (Bryant). *California Murre.*

The California Guillemot occurs sparingly among the places resorted to by *U. lomvia arra*, and is so intimately associated with that species, in mode of life, as to call for no separate description. The only difference in the birds is the character of the bill.

I am not aware of the extreme northern range of this species; this could be determined only by an indiscriminate slaughter of all the genus obtainable. I did not procure it at Saint Michael's, but observed it as far north as Saint Mathew's Island.

31*a*. URIA LOMVIA ARRA (Pall.). *Pallas's Murre.*

Pallas's Guillemot arrives at Saint Michael's as soon as the ice has moved sufficiently to show water in the cracks or about the bases of the small, outlying islets. This date is rarely later than the 25th of May. This species is not abundant in the immediate vicinity of Saint Michael's. At Egg Island, about ten miles from the entrance to the harbor, many of these birds breed every year on the bluffs and ledges. The egg is laid on the bare rock without pretense of nest. Only one egg is laid in a season if undisturbed, but will be renewed if the season is not too far advanced. The egg is very large, having a bluish-green ground with dark, brown mottlings of variable outline. The shell is exceedingly strong and may be rolled around in such manner as to astonish any one not familiar with it. It is very palatable and remains fresh for a long time.

At Cape Newenham, on the north side of Bristol Bay, I saw thousands of these birds repairing to the cliffs of that cape. They were especially numerous in other localities along the northern side of Aliaska. Along the entire Aleutian chain these birds are to be found. At Bogoslov Island millions of them breed every summer. I was in a boat within few yards of that island in June, 1880, and passed within 300 yards of it in a vessel in June, 1881. A large colony of sea-lions breed here every year. Some of the crew fired rifle shots at some of the sea-lions, and when the sound of the report was reverberated against the bluff the air was filled with these birds. The entire surface of the island, from 100 feet from its base to its top, was made white with the breasts of these birds. The island is about 600 feet high, and conical, composed of disintegrating, angular pieces, constantly being detached, by action of the weather, from the mass which composes the island. When the birds flew from their nests small pieces of stone were thrown down, and these again started others, that on one occasion caused, by the great mass of fine rock falling on it, a huge rock to come bounding down its side right in the midst of one of the principal places where the sea-lions were lying. The large rock that fell was not less than twelve feet square, and weighed over a hundred tons. The thundering noise caused the hundreds of sea-lions to take to the water, and in their haste many were so injured as to be incapable of regaining their places when their alarm had subsided. The rock rolled on several, and mashed them flat. The birds took flight, and darkened the air with their numbers.

These birds are very quarrelsome during the breeding season, and many are killed by being dashed on the rocks below the nests. I have frequently, after a hard storm, found these birds dead on the beach where the waves had thrown them.

On the water these birds ride gracefully and have the habit of swimming on one side only. I had observed this feature in several of them, and suspected the birds to have been wounded, but on chasing them I found to the contrary. They have two notes, one of which is like the bleat of an old ram, the other is like calling *a-a* to some one at a distance. From the latter note is derived the specific name of the bird. The Eskimo call them *Áhl pa*. The Russians call them *Arra*, and some writers have supposed this to be the origin of the specific name, but in all the languages of the people neighboring to these birds the vernacular is derived from the note *a a*, and in these languages the name invariably begins with *a*. The iris and bill of this bird are black, the feet are dusky. The flesh is palatable and is eagerly eaten by the natives.

This bird is quite plentiful among all the Aleutian Islands, and is a winter resident from Unalashka to the end of the chain.

36. STERCORARIUS POMARINUS (Temm.). *Pomarine Jaeger.*

The Pomarine Jaeger arrives at Saint Michael's by the first week in June, or it may arrive by the 23d of May if the season is sufficiently advanced. This species is an inhabitant of the drier

portions of the lowlands, usually solitary, though several may be seen at one time in the neighborhood. When not on the wing they may be seen sitting on an elevated tussock of grass watching for insects. They seek their food by wandering over great areas, generally the chains of lakes. Any refuse matter, small fish or wounded bird, is eagerly seized by them. When sitting on the water the buoyancy of this bird is such that it seems to scarcely touch the surface of the water. The iris of this bird is dark brown, tarsi and toes bluish, web and soles black.

37. STERCORARIUS PARASITICUS (Linn.) *Parasitic Jaeger.*

The Parasitic Jaeger arrives at Saint Michael's about the same time as the other species. This species frequents the water more than the Pomarine Jaeger. It searches the beach, bays, and lakes for food, which consist of fishes that may have been cast on the beach, shell fish, and other animal food. They also eat the berries of *Empetrum nigrum*. They harass the Gulls and terns, causing them to disgorge the food which they have just swallowed. On one occasion I saw two of this species attempt to chase a Gull, *L. barrovianus*, which is not an active bird on the wing, but on this occasion was in a bad humor. Amidst the fiercest screams the Gull succeeded in putting both the Jaegers to flight, and pursuit was continued for several hundred yards.

I was out one evening, just as the sun had disappeared behind the hills. When I came to the chain of lakes back of Saint Michael's, I observed several muskrats swimming in one of the shallow lakes. After I had watched them for some time, I shot one and took off its skin, which I threw on the surface of the water. A gentle wind drove it several yards from me. I was about to go elsewhere, when I observed a bird, half a mile off, making directly for me. I recognized it to be a Jaeger, which, with scarcely a movement of its wings, drove straight for the piece of muskrat-skin. It seized the skin in its beak and then passed it to its claws, by which it carried it off a little distance and began to strip the adhering muscle and fat from it. This bird was certainly possessed of keenest eyesight. These birds are said to breed on the faces of high bluffs. I never saw the nests or eggs. This bird is a frequent visitor to the Aleutian Islands. I observed it at Atkha July 17, 1879, and again in June, 1880, at the same place. A few days after I saw one flying near the vessel while off Kiska Island. At the Semichi Islands it breeds abundantly, according to the assertions of the natives. I have seen the bird on several occasions near Chichagof Harbor, Attu Island, but it visits only this island from Agattu and Semichi.

At Amchitka Island I saw several of these birds sitting on the hillocks and tussocks of grass. They were at this place exceedingly shy, and would under no circumstances permit me to approach within gunshot. During fine weather these birds have the habit of sitting for a long time in an apparent doze. Of the many individuals seen on the Aleutian Islands I have never observed that activity of this bird which characterizes it in the Yukon district.

The Eskimo have many traditions connected with this bird. They ascribe great prowess and bravery to it. In the earliest times this bird was a cannibal, and is now called *A hlúkh ta yóo lē*, and means thief, because it formerly stole men. The iris of this bird is brown, tarsi and toes blue, web and soles black, claws black, beak blackish.

38. STERCORARIUS LONGICAUDUS Vieill. *Long-tailed Jaeger.*

The Long-tailed Jaeger arrives several days previous to the appearance of its congeners. The 18th of May, 1875, was a day of special abundance. I killed nine of them that day, and did not walk out of an area bounded by thirty yards square. On their first arrival they are somewhat gregarious, though this may be due to the limited portions of ground free from snow. At this time the little pools of the low ground are being rapidly thawed out; many cracks in the heaving sea-ice expose the water to view. These places are then scanned for food. When the ice in the lakes and larger ponds is melted, these birds usually are hovering in the vicinity, or seated on some knoll watching a gull or tern dive for a fish. The Jaeger gives chase, uttering a scream that frightens the gull or tern, and causes it to disgorge the fish. The Jaeger is extremely swift on wing, and when pursuing another bird thrashes the air with wing and tail, giving an undulatory motion to the body. These birds may frequently be seen sitting on a solitary rock, exposed in some shallow tide lagoon, or else walking along the beach, in search of food cast up by the sea.

Their nests and eggs were not obtained by me. They are said to build on the cliffs and bluffs

along the Yukon River near Mission. They also breed on the hillsides of the tundra. Several pairs were known to be breeding near Saint Michael's, but I failed to discover their nest. During the breeding season they are very shy. In the fall they have sufficient curiosity to allow them to be killed. Should one of their kind be shot and slightly wounded the others will gather round it, and if not frightened away will soon dispatch their comrade.

I had frequently wounded desirable species of ducks and other birds on the lakes, but when taken out by the wind from my reach I had to leave them until I returned, sometimes the next day. On my return I always found that the feathers had been plucked from the breast of the bird and the flesh had been eaten. I suspected the muskrats of having done it until I detected a Jaeger in the act of eating a bird which I had left.

The Long-tailed Jaeger is rarely seen on the Eastern Aleutian Islands. I saw one at Sannakh Island in July, 1878. I saw a few at Atkha Island in 1879, and two at Attu Island in 1880. They were flying over the water of the bays but never in gunshot. This species is reported to breed at the Semichi Islands—there among the little knolls of the low ground. Throughout the Territory of Alaska the Jaegers are known to the Russian-speaking population as *Ras bói nik*, a word meaning robber, thief. The Eskimo of Norton Sound call this species *Yúng ŭk*, and means little man. The Jaegers are all intimately connected with many of the traditions of the Eskimo.

40*a*. RISSA TRIDACTYLA POLLICARIS Ridgw. *Pacific Kittiwake.*

The Pacific Kittiwake is a common bird at Saint Michael's when the ice breaks up, a date which varies from the 15th of May to the middle of June. They remain longer than any of the gull kind, except *L. barrovianus*. It is not an abundant bird at any time in this vicinity. The great breeding-grounds of this species is farther south. On the Pribylof Group and some of the western Aleutian Islands this species breeds in thousands. In this locality (Saint Michael's) I am led to infer that it breeds but sparingly. A young female (a bird of the year) was killed October 2, 1874, at Saint Michael's.

The adult plumage is assumed the first year. This specimen presented the following pattern of coloration: Head pure white with circumorbital space clouded with more or less black. Postauricular space and a narrow band over hind neck black, succeeded by a grayish band reaching to the interscapulars. Back dark gull-blue, lightening toward the upper tail coverts, which are pure white. Tail black tipped for little more than an inch. Wing coverts at their insertion blackish with numerous lighter pearl-blue markings which become white on the tips, forming a longitudinal band. Primary coverts black. Primaries black, excepting the inner ones, which are white tinged with blueish. The under side of the primaries is black with white shaft to the quills. The plumage below is pure white. Iris black, bill black, claws black, feet pale flesh. This Kittiwake usually seeks its food against the wind, and if several birds are together they go abreast, stretched out for many yards in line. When an object of food is discerned this bird generally mounts a few feet and comes down with a plunge, and remains on the water scarcely an instant. I have never seen one sitting for any length of time on the water. They are nearly always on the wing.

41. RISSA BREVIROSTRIS (Bruch.). *Red-legged Kittiwake.*

The Red-legged Kittiwake is not a common bird in the vicinity of Saint Michael's. The only one obtained there was a young female, dated September 18, 1876. Farther south this bird has been observed in thousands. The Aleutian Islands and the Pribylof Group are its home. On Akutan quite a number were observed on a high cliff near the village on that island. In the same year (1878) I saw a few at Sannakh, and in later years I frequently saw them passing the vessel which I was on. To the westward this Kittiwake occurs more plentifully than *tridactyla*, with which it associates.

Not having opportunity, during the breeding season, I did not obtain eggs of this bird.

The rich vermilion of the legs, the crimson eyelids, clear hazel iris, with the pure white of head, neck, and under parts contrast beautifully with the pearl-gray mantle of back and wings.

The Eskimo name of this bird is *Ég lŭk*, and signifies big throat.

42.1. LARUS BARROVIANUS Ridgw. *Western Glaucous Gull.**

This Gull is the earliest bird to arrive at Saint Michael's. By the middle of April they arrive in few numbers, sailing high in the air, almost out of sight. Their note, being the first intimation of their presence, is always gladly welcomed as a sign that the ice, farther south, is breaking up They resort to the low places on their arrival and eagerly scan the fissures of the ice for food. They are not at all shy at any season of the year. As they sit on the exposed rocks, just at the edge of the water, a native, or other person, in a canoe may pass so close to them that they may be knocked off with a paddle. At times they wrangle with the ravens for the offal of fish which some native fisherman has left in the village. This large Gull is not particular about food. Anything which he can swallow is gulped down. I saw a young bird of this species catch a tomcod that was too large to be swallowed. It flew to the bank and picked it to pieces. This bird had been following my canoe for many hundred yards, and when it caught the fish it was not twenty feet away.

This Gull nests in a tussock of grass that may grow in the middle of a pond in the lowlands, otherwise foxes might disturb it. The nest is built of grass and other material. The eggs are deposited early in June and are two or three in number. Should the eggs be removed the parent will renew the complement, but only one or two will be laid. The period of incubation is about three weeks. The young are downy and pure white on their first appearance, but soon change to gray with darker mottlings. The plumage in the fall of the first year is dark and remains so until the fall of the second year, when it is changed to a much lighter shade. The spring of the third year gives it the adult plumage of pearl gray and white. A most beautiful bird, so neat in plumage that, though it walks the muddiest beach and sits in the mouths of the little streams, which pour out a torrent of muddy water after a hard rain, not a single feather will be soiled. Among the Aleutian Islands these birds remain throughout the year, though in winter much less in number. They are compelled by severe periods of weather to come directly into the villages for food. I have frequently seen them sitting on the sod-covered houses of the the natives. At these times I have seen them scarcely fly when approached. They sit among the breakers of the little bays, and when a wave would come and threaten to upset them a single flap of their large wings enabled the wave to pass beneath without disturbance to the bird, which was waiting for the undertow to wash up some refuse matter that would offord a morsel of food. They frequently get rolled over by a wave when their attention is too deeply riveted on some object that a previous wave had brought to view. When taking flight from the water these Gulls spread their wings out and run for several feet on the surface of the water.

This Gull is especially numerous in some localities. At Saint Michael's but few breed, while on some of the Aleutian islands, especially Akutan, Umnak, Amchitka, Amlia, many thousands breed. At Karlúk, on the northwest shoulder of Kadiak, I saw countless thousands of these Gulls in August, 1881, as they were on the cliffs near the fishing station.

The bill and the feet of the young bird are brown to lead gray. The adult has flesh colored feet, and yellow bill, on which is a red spot near the end of the lower mandible.

The note of this bird is variable, in spring a harsh *kaoú*, which changes to a deep *honk* in a few weeks. When flying along the shore a prolonged, grunting croak is uttered. I have also observed that the Western Glaucus Gull changes its note during the winter, as at this time a note is uttered which is heard at no other season; and in the spring the note is not again heard.

The Eskimo name for the Western Glaucus Gull is *Kō kĕ'zh ᵹŭk*, meaning the large one uttering *ko ké*.

The Aleuts have several names for it to indicate the special plumages as are shown by the age of the bird. The adult is called *Hlú kakh*, and is derived from the note of this species.

There is no special use made of these birds by any of the natives of Northern Alaska, except for food. The flesh of the young bird is considered excellent, and when other food is scarce an old Gull is often killed for that purpose. The eggs of this species are excellent when fresh, but become rancid in a few days.

44. LARUS GLAUCESCENS Naum. *Glaucous-winged Gull.*

This Gull occurs sparingly in the vicinity of Saint Michael's, where I obtained one specimen.

* See "Auk," July, 1886, pp. 330–1.

Along the Aleutian Islands it occurs in greater numbers, but is generally in the less accessible places. I obtained a specimen at Unalashka Island in the winter (December 14) of 1878. I did not observe it so often in the eastern islands of the Aleutian chain. It occurs plentifully round Sannakh, the Shúmagin Islands, and Kadiak, and abundant on the Nearer Group. I did not obtain eggs of this species, though it doubtless breeds along the entire coast of the territory south of Bering Strait.

55. LARUS BRACHYRHYNCHUS Rich. *Short-billed Gull.*

The Short-billed Gull arrives at Saint Michael's according to the openness of the season. It comes in few numbers as soon as large cracks are made in the ice. This may be early as the first of May or as late as the 25th. The season of 1874 was unusually open. Upon our arrival at Saint Michael's, on May 25, hundreds of these gulls were flying over the bay. In the course of a few days they became less, so that by the middle of June only few pairs were seen. In later years they were not abundant at any time, though the breaking up of the ice was accompanied with visits of numbers of them. During the breeding season these Gulls resort to the higher bluffs and cliffs. Such locations are not found in the vicinity of Saint Michael's, and but few pairs were known to breed there. Sometimes they breed on Whale Island near there.

Among the Aleutian Islands these birds congregate in many thousands on the cliffs to breed.

On the islands where I have been stationed natives also live. They and the foxes keep, to a great extent, these, and in fact nearly all other water birds, from breeding near the settlements. It is to the uninhabited islands that the majority of the birds resort, hence did not obtain the eggs of this species.

At Atkha Island, in the early part of August, 1879, a small species of fish (*Mallotus villosus*) was thrown up by the waves onto the beach. These fish cast their spawn in the sand and is covered by the next wave.

The Gulls of this species follow the wake of these fishes, and during the spawning season devour many thousands of them.

At Amchitka Island I observed this species frequenting the beach at low tide and securing the sea-urchins (*Strongylocentratus dröbachiensis* A. Ag.) which occur plentifully. The birds seize the prey, carry it several yards into the air and then drop it on the rocks; or, as it frequently happens, into the little pools left by the receding tide. These pools are of variable depth, but when of not more than a few inches deep, the bird again took the object to drop it, perhaps into the same place; evidently not with the intention of washing any objectionable matter from its surface, but simply from the fact that the bird had not yet learned to calculate the law of falling bodies, yet when the shell-fish was dropped on the rocks and broken open the bird greedily devoured the well-filled ovaries. These Gulls and the Ravens, frequently carry the shells far to the inland and there break them open with their beaks. The old shells may be frequently found on a knoll of ground or tuft of grass.

During the winter these birds retire to some other locality but not distant, as they return early in March to the western Aleutian Islands.

The flesh is said to be very good; the Aleuts eat it either raw or cooked. The bill, feet, and toes of this species are greenish yellow, the web yellowish, eyelids crimson, iris dark hazel.

60. LARUS PHILADELPHIA (Ord). *Bonaparte's Gull.*

Individuals of this species were procured and seen only at the mouth of the Kuskokvim River, June 17, 1879.

At that date the twilight lingers throughout the entire night, and during this time I wandered along the banks of a large lake, lying several hundred yards distant from the warehouse, used to store the trader's annual supplies in if he does not happen to meet the vessel when she arrives in the spring. I secured three specimens of this Gull, but was unable to preserve them on account of bad weather coming on the next day, causing other feelings than a desire to skin birds.

This is the only locality where I saw this Gull.

62. XEMA SABINII (Sab.). *Sabine's Gull.*

This Gull is found abundantly in the vicinity of Saint Michael's. A few miles farther south it is very numerous. It breeds along the low grounds from Saint Michael's to Bristol Bay.

A young one scarcely able to fly was obtained at the "canal" on the 21st of July, 1875. It had doubtless been reared at that place.

They are rarely seen in large flocks, though a dozen may be seen at a time. I saw once a flock of not less than seventy-five, on the 29th of October, 1876, flying northward past the redoubt. They settled on the water of the bay for a few moments and took their flight farther northward.

Their food consists of worms and aquatic insects.

I examined the crops of eight specimens that were obtained July 21, 1875, and all were filled with aquatic larvæ of an insect that could not be determined.

I have never seen this bird hovering over the ponds like the Gulls and Terns.

I observed this species at the mouth of the Kuskokvim River in June, 1878, and at Nushagak and Tûgiak, on Bristol Bay, in the same month.

It is not found on the Aleutian Islands, except in rare instances, as I saw but one at Atkha Island, in July, 1879, and one flying near the vessel off Kiska Island, in June, 1880.

The young birds have a black bill and flesh-colored tarsi, toes, and web; claws black.

The adults have a black bill with yellow tip, iris black, eyelids bright red; tarsi, toes, and web dark lead color; claws black.

The Eskimo name of this bird is *Na chŭ'thl ngá ŭk*, and refers to the cap or hood of the bird.

71. STERNA PARADISÆA Brünn. *Arctic Tern.*

The Arctic Tern is one of the earliest birds to arrive at Saint Michael's. The earliest date recorded was April 25, a very early season, showing that the Terns only await the movement of the sea-ice to appear in any locality. They become very abundant by the middle of May. They breed on the low grounds, preferably a low, damp island, such as those at the northern end of the "canal." On this place hundreds of nests were discovered in 1876.

The nest is merely a bare spot on the ground; sometimes a few blades of grass surround the margin of the nest, but these seem to be more the result of cleaning off a bare spot than an attempt to construct a nest.

The eggs vary from one to two, never more.

The Arctic Tern is so intimately associated with the Aleutian Tern, both in nesting habits and procuring food, that the remarks for the one will apply for the other. Their nests are sometimes placed within two feet of each other, and apparently without causing animosity between the species.

The young are hatched in two and a half weeks, and are ready to fly by the first of August.

These birds remain until the end of the first week in September, or some ten days later than *S. aleutica.*

They procure their food by flying over the water at a slight distance, the head constantly twisting to one or the other side to scan the surface for small fish. With a sudden dash, sometimes nearly disappearing beneath the water, the bird rarely fails to bring out the fish for which it dove.

The Tern will sometimes not see a fish until it has flown past the object, and under such circumstances I have seen the bird turn a complete somersault and twist over right side up and dive for the fish it had just passed.

When they have completely wetted the surface of their plumage they halt for an instant, in their flight, and a quick shiver causes the water to be shaken off.

They are frequently harassed by the large Skua Gulls or Jaegers (*Stercorarii*), which cause the Terns to disgorge the contents of their crops.

The Terns evince their displeasure by a defiant *squae.*

The bill of this bird is crimson; tarsi vermilion. The young birds have flesh-colored bill and feet.

The Eskimo name of this Tern is *Tú kuthl kwí ŭk*, and refers to its note.

I have observed this bird at Kuskokvim River, Bristol Bay, Atkha Island, and at Attu Island. Among the Aleutian Islands it is not at all common, although more plentiful to the westward portion of the chain.

73. STERNA ALEUTICA Baird. *Aleutian Tern.*

The Aleutian Tern arrives at Saint Michael's by the 1st of June, and remains until the latter

part of August. It is very abundant in this vicinity, breeding plentifully on a small island just at the northern end of the "canal." They are usually associated with *S. paradisæa*, both in procuring food and nesting habits. The nest consists of a bare spot on the ground, with few wisps of grass round the margin of the nest. Sometimes no sign of a nest is visible; the eggs then are deposited on the ground. The number of eggs is one or two. Incubation lasts for seventeen days. The young are able to fly by the first of August.

The note of this bird differs from that of *S. paradisæa* in that the "squay" is weaker and squeaky; the other note is like *twe-e-e-e* prolonged, and is readily distinguishable from the harsher "squay" of the *S. paradisæa*.

I have never observed this Tern among the Aleutian Islands, although it may occur there, especially on the less rugged islands.

The Eskimo name of this Tern is *Eg lŭg ná gŭk*, and refers to the white stripe on the head.

81. DIOMEDEA NIGRIPES Aud. *Black-footed Albatross.*

The Black-footed Albatross is quite a common bird in some localities north of the Aleutian Islands. In Bristol Bay in June, 1878, I saw numbers of them in the vicinity of Cape Newenham. They were not shy and seemed perfectly at home. Toward the western Aleutian Islands they are not common but are frequently met. They follow the vessels for miles or even day after day, feeding on all manner of scraps of food, which were thrown overboard from the galley.

They have a peculiar note, which is only uttered when a less fortunate bird attempts to seize a morsel of food from another's beak. The note is then a whining groan. On the wing these birds are extremely graceful. They rise and fall in their flight with the curve of the wave over which they sail; and, at times, it seems as though the tips of their wings touch the water; and apparently without effort these birds will continue on flight for a great distance without other movement of their body than a simple roll to one or the other side.

I have often tried to catch them by baiting a piece of pork on a hook and letting it trail many feet in the wake of the vessel. The birds become very intelligent and soon suspect the intention. They seize the baited hook in the tips of the long, stout beak and by rising partly on wing, with feet spread out and tail bent into the water, they make a strong pull against the line; and frequently snap a stout cord. Many will collect round the vessel and each one seems eager to snatch the food used as bait; they rarely try it but once. In rising from the water the wings are unfolded, joint at a time; and, only when the bird is on the water, a quick stroke with its feet sends it to the surface, where by skipping and flapping along the body gains sufficient momentum to enable the wings to carry it away.

I have no doubt that this bird breeds in some locality among the islands, for it is found there from the early part of May to late October.

There is much difference in the color of specimens seen in these northern localities. The bill is dusky to pure white, plumage sooty to lighter, with considerable white about the neck and chin. The feet are dusky to black. Some of these birds were suspected to be young of the year, but I could never get a specimen of them as they were too far off from land; and to obtain one, while a vessel is in motion, is impossible.

82. DIOMEDEA ALBATRUS (Pall.). *Short-tailed Albatross.*

The Short-tailed Albatross is found in great abundance in the neighborhood of Cape Newenham, near Bristol Bay. In June, 1878, I was on a vessel in that locality, and at one time counted fourteen individuals, flying or sitting.

The mouth of the Kuskokvim River was the farthest north that I observed these birds near the shore, but at sea I have seen them near Saint Lawrence Island. The natives of Saint Michael's assert they are to be seen in rare instances off the northwest point of Stewart's Island.

Among the Aleutian Islands they are quite common, but generally far out at sea. They approach the land during dense fogs, and may then be found sitting on a small rock jutting from the water.

I never could obtain a specimen in condition to save the skin, for the birds do not come near the settlements; and, when a native kills one he saves only the wings, from which to take the sinew

for wrapping round his spear heads. At Attu I saw two specimens that were killed in the latter part of March, 1881. The wings had been cut off and the body partly plucked of feathers. This species passes the winter in this locality and may be found, during very severe weather, about the western end of the island of Attu. I received a head (by which the species was identified) from Nushagak, on Bristol Bay, in September, 1878.

This species undoubtedly breeds near some of the places mentioned as having been observed.

86 *b*. FULMARUS GLACIALIS GLUPISCHA (Stejn.). *Pacific Fulmar.*

Hundreds of thousands of these birds were seen off Unimak Pass and the eastern end of Unalashka Island; in fact, they covered acres of water. The dark form prevailing in number, while the remainder were of the light form. To the westward I have seen them less abundant though still very numerous, near Seguam Island, Kiska, Amchitka, Atkha, and plentiful at Semichi.

The habits of this bird are very strange. They are seldom seen during stormy weather and then only individual birds. During calm periods these birds sit, some few miles from the land, on the water and will scarcely endeavor to avoid a vessel drifting through their midst. I have never seen a live bird of this species either on or over the land. Where a bird, so abundant as this, breeds or what its specific habits are I am unable even to conjecture.

With these birds are associated, in a manner, another bird of which I obtained, at Amchitka Island, a single specimen, which had been thrown up dead by the sea and so far advanced in decomposition that to lift it separated the members of its body. This dead bird resembled those associated with the Pacific Fulmars and was, so far as possible to identify it, a specimen of *Puffinus tenuirostris* Temm. Natives of Attu, who were with me on Amchitka Island, informed me that birds of this kind (like the dead one) breed plentifully on the Semichi Islands.

105. OCEANODROMA FURCATA (Gmel.). *Fork-tailed Petrel.*

A single specimen of this Petrel was brought to me by a native who had killed it while out in his bidarka (canoe) hunting seals off Stewart's Island. They are said to be rare in this locality, though abundant far out to sea. I had observed many of this species while I was traveling among the Aleutian Islands. They are rarely seen near land. The Atkha people assert that these birds breed abundantly on the cliffs of Korovinsky volcano, on the northeast shoulder of Atkha Island. I have seen this species as far westward as Attu Island. At Atkha a native brought me a specimen of this bird, but it had been kept so long before an opportunity occurred to permit his return to the village that the bird was too far advanced in decomposition to allow the skin to be taken off. The Eskimo name of this bird is *Ó ku ĭk*, and means oil-eater. They assert that this bird skims the water for traces of oil which may have flowed from a wounded seal or whale, and that large flocks of them will follow the floating carcass of a seal for that purpose.

120*b*. PHALACROCORAX DILOPHUS CINCINATUS (Brandt). *White-crested Cormorant.*

The White-crested Cormorant is a visitor to Saint Michael's by the tenth of June. It does not occur in great numbers in that vicinity; only few breed here. At Besborough Island, some forty miles north of Saint Michael's, this bird breeds in abundance on the walls of that almost inaccessible island.

A young bird of this species was obtained October 2, 1876. The gular sack is yellow, bill pale with darker culmen; feet and webs black. Iris dark gray. The Eskimo name of this Cormorant is *Mán uthl ká lĭk*, and means tongue cut off short.

The white plumes on the head of this Cormorant, in the breeding season, are used by the inhabitants of the Aleutian Chain to adorn the small sacks (used as work-bags) made by the Aleut women. The feathers of the neck are also used for the same purpose.

123. PHALACROCORAX PELAGICUS Pall. *Pelagic Cormorant.*

In most localities of the Aleutian Islands this form is extremely numerous. Along these islands the bird is a constant resident, apparently more numerous in winter than in summer.

It breeds on all the principal islands. The nest is usually placed on a ledge of some bold-

faced rock; and, in most instances, about forty feet above the sea. The nest is large, built of seaweeds, a few grass stalks, and an abundance of its own excrement.

They are filthy about their nests; the walls of the neighboring rocks are covered with the liquid excrement of this bird, and may oftener lead to the discovery of a nest than any other sign. The nests which I observed on Amchitka Island were being occupied June 7. The eggs number three or four, blue of pale shade to white in color. They receive accumulations from the nest and soon are indistinguishable in color. The young are hatched by the middle of July and take to the water by the middle of August. They are then somewhat heavier than the old bird. The young assume the adult plumage on the second year. The color of the bill is dark on the ridge and yellowish below, the upper mandible having a greater or less amount of dark while the lower is nearly always yellowish, with perhaps a lighter tip and darker base. The gular sack is red and wrinkled. I do not remember to have heard a sound uttered by this bird.

They are exceedingly inquisitive and will fly round and round a vessel or boat, sometimes within a few feet of the sails. When on the nest it frequently stretches out its snake-like neck to watch a passing canoe, and its curiosity not being satisfied the bird will leave its nest to follow.

It is by far the most beautiful bird of Bering Sea. The plumage glitters with metallic reflections of blue, purple, and bronze.

During severe weather of the winter and fall these birds resort to the high rocky ledges or the single rocks which jut from the sea. Some of the rocks are fairly covered with these birds, and these appearing like a lot of black bottles standing on the rock. The natives of all parts of the country use the flesh of this bird for food. Some of the Aleuts, especially those of Attu, prize the flesh more than any other bird. They formerly obtained many of these birds with a kind of net which was thrown over the birds when sitting on the shore rocks, being driven there by the severity of a storm so that the birds could not remain on the outer rocks without being washed off.

In former years this bird was reported to be extremely abundant at Attu, but has greatly disappeared in the last fifteen years.

Before the introduction of civilized clothing the skins of these birds were used for clothing. Fifteen of them were counted as a *parka* or long gown-like garment.

The natives of Attu have spoken to me of another cormorant, which many years ago abounded there, but in the last fifteen years none have been seen. They describe it as being fully twice as large as the red-faced cormorant and of different plumage. From the description, I have reason to suspect that the bird referred to was *Phalacracorax perspicillatus* Pall.

The Eskimo name of this species is *Ŭg á zhŭk*, and means cliff-dweller. This word is also used to mean any kind of dried, desiccated meat.

123*a*. PHALACROCORAX PELAGICUS ROBUSTUS Ridgw. *Violet-green Cormorant.*

The Violet-green Cormorant is very common near the entrance to Saint Michael's. These birds arrive about the 5th of June and remain until the ice closes in in October or November. They frequent the rocky shores and cliffs. A few of this species breed near Saint Michael's.

When passing along the shores of Bristol Bay I observed numerous Cormorants, which I also referred to the present form.

124. PHALACROCORAX URILE (Gmel.). *Red-faced Cormorant.*

A single specimen of this Cormorant was obtained at Saint Michael's. I did not to a certainty observe it in any other locality, though it is known to occur in numbers in other parts of the territory. The Russians have the word *U réel* to be an equivalent with our word Shag or Cormorant; and, again, the Russian-speaking population, together with the natives, have each singular ideas of color, so that any attempt to obtain information of birds, by describing their colors, is very unsatisfactory and frequently exasperating.

129. MERGANSER AMERICANUS (Cass.). *American Merganser.*

A pair of these birds was seen in the possession of a native at Unalashka Island, January 17, 1879. He would not part with them on any consideration, as he supposed the good will of the person to whom they were presented to be of more value than anything received from one outside

the pale of his church. They were the only ones of this species seen in the country. At Unalashka Island they remain during the winter, but do not breed there in the summer.

130. MERGANSER SERRATOR (Linn.). *Red-breasted Merganser.*

The Red-breasted Merganser is common in the Saint Michael's district. In the Aleutian Island district it is met with in pairs, and then only rarely. It is more abundant at Attu and Atkha than any other of the larger islands visited by me. In the Saint Michael's district it arrives early in June or late in May and remains throughout the summer to breed. The fully-fledged young were observed there in September.

At Atkha it breeds in the small ponds on the high levels of the mountains. I found a dead, young bird of this species on the 4th of July, 1880. Among all these islands this bird is a constant resident.

The flesh of the Red-breasted Merganser is quite a delicacy among the Aleuts, who seem to prize it higher than the flesh of any Duck.

The Eskimo call this bird *Pi' ŭk*, because the nest is shaped like the *Pi*, or hole, of the bidarka, or canoe, in which the person sits. The Russian name is *Kro khál.*

132. ANAS BOSCHAS Linn. *Mallard.*

The Mallard is a common duck in the Yukon district. It arrives about the 1st of May and remains throughout the summer. It is rarely abundant in any locality and seldom seen in large flocks; half a dozen individuals usually comprise a flock. It breeds wherever found in the summer season. It is plentiful on the Aleutian Islands in winter.

The low land at the head of Captain's Harbor, on Unalashka Island, forms a winter feeding-ground for hundreds of these ducks, where they congregate in large flocks in December and the earlier months of the year to remain until the season is sufficiently advanced to favor their northward migration. Only a few pairs were ever seen at Unalashka Island in the breeding season. At Attu Island this duck is common in winter. It breeds sparingly at Agattu Island and on the Semichi Islands. A few pairs were also observed at Amchitka Island in the latter part of May, 1881. During the fall and winter the flesh of this duck is excellent, being fat and tender. The Russian name of the duck is *Sé le sen.*

135. ANAS STREPERA Linn. *Gadwall.*

A single specimen of the Gadwall was obtained at Unalashka Island in December, 1878. It is not common among the Aleutian Islands, but is abundant along the Yukon Delta district in summer. In habits it is nearly identical with the Pintail, and often associated with them. It breeds in the high latitudes, but not on the Aleutian Islands that I am aware of.

137. ANAS AMERICANA Gmel. *Baldpate.*

The Baldpate is not abundant in the Saint Michael's district. It arrives about the 25th of May, or even later. It is not at all gregarious, being found solitary or in pairs. It frequents the marshes, preferably those which are overflowed by the higher tides when it first arrives. As soon as the season is advanced and the greater part of the snow is gone, the little rivulets are full of muddy water they resort to these places for food. They seem to delight in, shovelling among the mud in search for their food. I once saw two ducks (which, at the distance, I could not recognize) feeding in one of these small mud sloughs. I made quite a detour; one ran up to the top of the bank and watched me, as it thought, go away, and quietly returned to its mate. I came back to the place by another way and approached within a few yards of them unobserved. They plunged their heads at times completely under the soft soil to obtain a tender root or slug. They seemed to be in a playful mood, as they frequently caressed each other by putting their heads round each other's necks and crowding near each other. One finally came up to the top of the bank and was then within a few feet of me; with a sputtering squak it flew off until I dropped it. It was a male. The female flew off.

The flesh of the Baldpate is fine eating.

I have never observed this species among the eastern Aleutian Islands. To the westward I

saw a pair that were feeding at the mouth of a little stream which runs through the village on Nazan Bay, Atkha Island. I fired but failed to obtain them; I never saw them afterward.

At Attu Island the Baldpate is rare, a summer visitor, and not ascertained to breed. The conditions on Semichi are favorable for a breeding locality of this species.

138. ANAS CRECCA Linn. *European Teal.*

A male of this species was obtained by me at Aktha Island June 28, 1879. As it was the only specimen observed and nothing differing in habits from *A. carolinenses* at the time it was procured, I can give no information other than it is extremely rare and not known to be other than a summer visitor and probably breeding among the islands of the Aleutian chain.

This is the first specimen of this species recorded from the Pacific coast of North America.

139. ANAS CAROLINENSIS Gmelin. *Green-winged Teal.*

This beautiful little duck is found in all parts of Alaska. It arrives at Saint Michael's by the 10th of May.

It never occurs in large flocks; singly, in pairs, or less than half a dozen individuals being the usual numbers seen at once.

Along the low lands bordering the "canal," at Saint Michael's, it can be found at any time from May to September 25th. It breeds among the sedges at the margins of the ponds. In the fall it resorts to the lakes of the higher grounds. This bird is not at all shy and endeavors to conceal itself among the grasses rather than take flight.

Many of these ponds have a species of grass growing on their margins that forms a kind of matting of its roots and stalks that in time encroaches on the pond in such manner as to completely cover it. This sends its tender roots down into the water and in time forms sufficiently firm masses to walk on. The Teals seek these places for food and when surprised usually dive under the mass of vegetation out of sight. A careful search will sometimes reveal just their head and neck thrust out of some hole while their body is hidden below.

I once shot a Teal, which dove under the edge of the grass on the margin of a pond where it was sitting. I thrust a stick under and could feel for over a yard without interference of grass-roots, yet it had sufficient firmness to support me even on its edge. I then knew how it was that wounded ducks always disappeared in such a hitherto, mysterious manner.

I have observed the Green-winged Teal at the mouth of the Kuskokvim River in the early part of June, 1878, and in the same month at Nushagak settlement, on the river of that name; also at Ugasik, on the peninsula of Aliaska. It is found on all the larger islands of the Aleutian Chain. At Unalashka it occurs in the neighborhood of Captain's Harbor at all seasons of the year. It undoubtedly breeds there, although I have not seen the eggs or nest in that exact locality. It also occurs on all of the islands west of Unalashka. At Atkha, Amchitka, Semichi, and Attu it is abundant. At Atkha it seems to prefer the bars that make off the mouths of the creeks which empty into the sea. Just below the village on Nazan Bay, at Atkha Island, is a small stream that throws out great quantities of sand, gravel, and clay. Quite a bar, or shallow place, has been formed by it, and when the tide recedes a large area is exposed, to which Gulls, Mallards, and Teals resort.

At Attu the Teals frequent the southern side of the island more than the northern.

At the Semichi Islands numbers breed every year among the marshes that abound there.

At Amchitka Island they were extremely abundant in the middle of May, 1881. Along all the little streams that were cutting deep into the earth, and so narrow that the tall grass completely hid them for many yards of their length, the Teals were found walking along under such places, searching for tender roots and insects. These streams are not long, as they are usually the outlets of some inland lake, and their sides are prevented from widening by the dense mat of grass-roots, so that their streams are deep and narrow. As soon as the current has excavated beneath the roots of grass the stream widens, and the banks thus form an overhanging shelf on each side. Under these places the Teals resort, so that it is difficult to find them, as they will not fly up while in such places.

In the evening they assemble in the larger, shallow lakes, and even then sit or dig singly or in pairs, as they are distributed over the surface of the lakes.

At Amchitka Island their breeding-places are among the tall grasses that grow on the seaside of sand-banks thrown up by the ocean, or else on the steep slopes of other hills facing the sea.

The flesh of this bird is excellent and usually fat, except in the middle summer months.

The Russian name of this species is *Chērók.*

140. ANAS DISCORS Linn. *Blue-winged Teal.*

The Blue-winged Teal was not obtained by me. A native had a specimen which he had killed in the lakes, on the mainland, a short distance from the Redoubt. The bird was minus the greater part of its feathers, excepting the quills of the wing and feathers of the head. The speculum of the wing was sufficient to determine the species. I saw several individuals on the wing in the fall, but could not procure them.

At Atkha Island, July 7, 1879, I saw a female of this species sitting among some seaweeds in a place where I could not approach unobserved. I had cartridges loaded only with No. 12 shot. I waited some time, hoping the bird would approach sufficiently near to kill it with such fine shot, but when fired at they had no effect on the bird.

I am inclined to believed that this species is a very irregular visitor to the Aleutian Islands, yet the Green-winged Teal abounds there.

At Saint Michael's it is not at all common, and more plentiful in the spring than fall. It undoubtedly breeds in the interior.

142. SPATULA CLYPEATA (Linn.). *Shoveler.*

The Shoveler is a rare bird in the vicinity of Saint Michael's. The only specimen obtained by me was shot near the "canal" on the 25th of May, 1877. It is rare from the fact of the many hundreds of birds brought by the natives to the store to sell I never found one of this species among them.

143. DAFILA ACUTA (Linn.). *Pintail.*

The Pintail is a common duck in the Saint Michael's district. It arrives with the earliest birds, early in May, and remains until late in September. It breeds among the lagoons which abound in this locality.

The Pintail is found sparingly on Unalashka Island in November. It does not winter on the Aleutian Islands to my knowledge, as none were ever observed there later than that month.

This duck feeds principally on the tender shoots of sedges and other grasses that grow round the margins of the marshes. They become very fat, and are then sluggish and slow to rise. In the spring they are lean and rather shy. They fly faster than any other duck. Their flesh is excellent in the fall.

This bird is usually found in small flocks or in pairs.

148. AYTHYA MARILA NEARCTICA Stejn. *American Scaup Duck.*

The Scaup Duck is not common in the vicinity of Saint Michael's. It prefers localities with higher coasts than there. It is said to be rather plentiful on the outside of Stewart's Island and in the neighborhood of Unalakhlit.

This bird arrives there as soon as the sea is partially free from ice. In this locality I never found the nest or eggs, but it undoubtedly breeds there.

It is common along the entire Aleutian Chain, but it is shy and difficult to obtain. It is more abundant in winter than in summer, and remains the entire year.

150. AYTHYA COLLARIS (Donov.). *Ring-necked Duck.*

This bird is not common in the vicinity of Saint Michael's. It arrives as soon as the sea is partially free from ice, this date being variable—May 9 to the last of the month. It also frequents the brackish lagoons in the earlier months. The nest and eggs were not obtained.

It is rarely seen about the Aleutian Islands. It is so shy as to scarcely permit approach within gun-range.

At Amchitka Island I observed a male of this species in a fresh-water lake near the center of the island. The bird was extremely shy, and under no circumstances could I approach within sufficient distance to procure it without it instantly dove out of sight and disappeared. I suspected the female to have a nest in the vicinity, although I could never detect her whereabouts.

In Chichagof Harbor (Attu Island) I observed several individuals of this species during the winter of 1880–'81. I repeatedly attempted to secure them, but failed on account of the shyness of the bird. Whenever observed at this place the bird was always alone; two or more were never seen at a time.

150. GLAUCIONETTA CLANGULA AMERICANA (Bonap.). *American Golden-eye.*

A single specimen of this bird was brought to me at Saint Michael's, but it was not in condition to save the skin. It does not appear in any numbers there. The few to be seen were individuals, always singly.

It is not common among the Aleutian Islands. In Unalashka it was obtained in the month of December, and remains there all winter. It was never observed there in summer, and at no season among the extreme western islands.

153. CHARITONETTA ALBEOLA (Linn.). *Buffle-head.*

The Buffle-head is not common in the Saint Michael's district, and not plentiful anywhere in the territory that has come under my observation.

It occurs at Unalashka in the winter, when my specimens were obtained. It was not observed to the westward on the Aleutian Chain, except rarely, and then only in the winter.

154. CLANGULA HYEMALIS (Linn.). *Old-squaw.*

The Old-squaw is a common sea-duck in all parts of the Saint Michael's district. It arrives early in May and remains until the ice closes in November. It winters among the entire Aleutian Chain, and is extremely abundant there. They breed to the far northern regions, and only sparingly at Saint Michael's. It only sparingly breeds along the Aleutian Islands among the fresh-water ponds. It is essentially marine in its habits, and was never observed in the fresh-water lakes or streams excepting during the breeding season. It is remarkably strong in flight and alights on the water with a hard dash, making the water fly for many feet. It also ascends to great heights as it flies from one locality to another, if distant. It is very noisy and the note may be heard a great distance. The natives of Attu call this bird *A láng ŭk*, from its note, which is repeated at short intervals.

It congregates in large flocks, sometimes of over a hundred. They search for their food in the shallower places in the coves and bays. When searching for food they string out in a long line and swim abreast. At a signal one at the extreme end goes down, the rest follow in regular time, never all at once, and rarely more than two or three at a time. The last one goes down in his turn with the regularity of clock-work. As they dive they seem to go over so far as to throw the long tail-feathers until they touch water on the other side. They remain under water a long time, and usually come up near each other. They utter their noisy notes and again spread out for another dive. When wounded they swim many yards under the water. The flesh of this duck is not unpalatable, but has a decided fishy odor, which may disappear if the bird is cleaned and hung away for awhile.

155. HISTRIONICUS HISTRIONICUS (Linn.). *Harlequin Duck.*

This pretty duck is not common in the immediate vicinity of Saint Michael's. South of that place it becomes more numerous, and extremely abundant around all the Aleutian Islands. It prefers the rocky places, exposed reefs, and shallow gravelly banks that are alternately covered or left bare by the sea. The food of this duck is of an animal nature. Shellfish of all kinds do not come amiss, the common black mussel (*Mytelis edulis*) being its favorite food. These mussels are everywhere abundant on the rocks that are not exposed to too great a swash from the sea. Among the coves and small indentations of the sea, especially if in the neighborhood of small islets, these ducks are to be found in great numbers. They dive after the mussels, and are frequently caught by the shellfish and held until the former are drowned and cease their struggles, upon which they

are released. This bird is not at all shy. They are, in the middle of the winter, usually found singly or in small flocks. At this season they will even separate their ranks to allow a canoe pass between them, or else fly a few yards and again settle. They usually are near the shore, searching the shallow, pebbly places for food when the surf is high. When a breaker comes over them they dive until it passes. At Attu I have seen them dive before a breaker struck them, and in such shallow water that I often wondered how they held on, as they come up at times not a foot from where they went down. They have a peculiar whistle for a note, and in the mating season, early in March, they assemble in larger flocks (sometimes as many as twenty or thirty individuals form a flock); they then constantly utter this whistle, as they chase each other over and through the water. Several males will attend one female during this season until she selects her choice. During the breeding season I have seen three males with one female.

The flesh of this duck is good, but somewhat fishy.

The Aleuts have but little liking for its flesh, as they seldom shoot it when they have opportunity.

The nest and eggs were not procured and the only nest I ever saw was near Iliuliuk village, on Unalashka Island. Two immense blocks of rock had become detached from the cliff above, and when they fell their edges formed a hollow place beneath. In under this I discovered a deserted nest, which the native who was with me asserted was that of a bird of this species. The form was similar to that of the nest of *C. hyemalis*, and in fact so closely resembled it that I persisted in it being of this bird until the native asked me if I did not know that the Old-squaw did not build in such places.

157. ENICONETTA STELLERI (Pall.). *Steller's Duck.*

Steller's Duck is rare at Saint Michael's.

On the southern and eastern shores of Bristol Bay and the northern shores of Aliaska this species is plentiful.

Among the Aleutian Islands it is only rarely seen in summer. In winter it abounds in Captain's Harbor on Unalashka Island. It keeps off shore and ventures nearer only in boisterous weather. It dives deep in the water for its food, and remains under a great length of time. Its food is of an animal nature, procured from the sea.

I was never able to procure the eggs of this species.

The winter plumage of the male is extremely beautiful. The top and sides of the head silky, silvery-white, with faint greenish shade on forehead and lores; an anteorbital spot of velvety green; circumorbital black spot, narrow in front and wider behind; an occipital band of green, having a minute black edge at the lateral ends; rest of head and upper hind neck white; chin and throat black, with bluish reflection; a narrow collar of greenish blue-black on neck in front, which in the hind neck is continuous with the same color on the back, becoming purplish blue-black on the upper back and darkening posteriorly, where the rump and upper tail-coverts are lustrous, dark slaty black. The scapulars and interscapulars long, and the latter linear, having the exterior web, with brilliant, violet blue-black reflection on each of the linear feathers; the inner web white, and each of these feathers tipped with white. The speculum of same color, but with a white interior spot on each feather, forming a perpendicular bar; preceding the speculum is a white bar, having nearly double the width of the posterior one. Wing slaty black, rather ligher toward the insertion of the quills; tail same color as wings. A narrow white collar incircling the upper breast and broadening out on the sides of the lower hind neck. A small blue-black spot on the sides of the breast where the feathers overlap the carpal joint of the closed wing. Under surface of the body deep brownish black, darkening posteriorly, to become black on the crissum and under tail-coverts, and becoming rich reddish brown on breast and sides, which on the upper sides and upper breast become buff, fading to a creamy white on the shoulders and under the wings. The sides directly under the carpal joint of the closed wing have a distinct black blotch of small size.

The female in winter has the head light olive-brown, slightly mixed with rufous and finely marked with black, producing faint narrow bars. On the neck and upper back the reddish brown is confined to a crescentic margin and tip to each feather, inclosing a small, rounded black spot, the middle having a narrow tip of reddish brown of darker shade to each feather, becoming abso-

lutely barred with black and rich chestnut on rump and upper tail-coverts. Scapulars rather lighter than back and with a narrow edging of brownish on each feather, the tips of the linear interscapulars with silvery-gray. Wing rich, dark chestnut. The speculum bluish-black, edged with white as a wider bar anteriorly and narrower posteriorly with the white bar. Breast and sides rich, light reddish-brown, with a rounded dot of blackish brown on each feather. These colors become blended on the breast and abdomen to produce a dark brownish-black on those parts, and darkening posteriorly. The iris dark-brown, bill dusky horn blue, feet dusky olive.

On the western islands of the chain I have observed this duck to be quite plentiful about the Nearer Islands during winter, and few were seen along the western end of Attu in July, 1880, the natives asserting that it breeds sparingly on Agattu.

158. ARCTONETTA FISCHERI (Brandt). *Spectacled Eider.*

This large Eider is common in the vicinity of Saint Michael's, where it arrives early in May.

Along the coast of Bristol Bay it is extremely abundant with others of this genus.

Its nesting habits are similar to that of the King Eider.

This species occurs among all the Aleutian Islands, where it breeds and is a constant resident, but extremely shy.

161. SOMATERIA V-NIGRA Gray. *Pacific Eider.*

The Pacific Eider is to be found in all parts of Alaska that have come under my observation, viz: Norton Sound and coast south to Peninsula of Aliaska, and west to Attu of the Aleutian Islands, and east to the entrance of Cook's Inlet and neighborhood of Kadiak. At Saint Michael's it is common, arriving as soon as the sea-ice breaks in the spring. My earliest specimen was May 31, 1875.

In Bristol Bay it is plentiful and extremely abundant in the neighborhood of Ugasik, where I have seen thousands at a time on the bars left by the receding tides on the northeastern shores of Aliaska.

Among the Aleutian Islands it is a constant resident, the greater number being found in winter.

At Saint Michael's they breed in considerable numbers and there prefer the open *tundra* for a nesting place. A nest was found with eleven eggs on the hillside about half a mile back of the Redoubt. The nest was made in a mossy situation, consisting of few blades of grass and well lined with the sooty-colored down from the abdomen of the bird itself.

Along the Aleutian Islands the bird prefers the steep slopes heavily clothed with rank grasses, such as wild rye (*Elymus*), which grows in huge tussocks, among which the nest is hidden. A slight depression is scratched out; the eggs are placed on the bare ground, the down being used only as a cover for the eggs when the parent is absent from the nest. The eggs are never placed on the down.

The down is plucked from the breast for that purpose only, and increases in amount as the increased complement of eggs demands a greater amount of covering.

The nest when first scratched out is usually left to dry out several days before it is used, as the bare spots were sometimes seen a week before an egg was deposited. With the first egg only a small quantity of down was found in the nest, and will be replaced two or three times if removed. When the nest is full of eggs and they, with all the down, are removed, the bird seeks some other locality for again laying fewer eggs, generally not more than five for the second nest. Another peculiarity that was brought to my notice by a native was that these birds usually seek some slope where the Duck Hawk has its nest on the high point forming one end of the slope. This was true in three instances that came under my observation. The Eiders were more numerous in such localities than otherwise. The natives always are glad when the Hawk comes screaming overhead as the canoe is being paddled along the shore, for they know the nest of the Hawk is near and that many nests of the Eider will be found close by. The female Eider becomes very fat in the breeding season. This may in a measure compensate for the loss of the down from her breast. The skin on the breast also is thicker and, with the layer of fat, will be over half an inch in thickness. The male Eiders are at this season very poor and lean.

In the early spring I have seen as many as seven males following one female as they were flying by. I further believe that a female is never attended by a single male, as always two or more males were seen with a female. At all seasons of the year the males are more numerous than the females.

The Eiders never resort to the fresh-water ponds. They are seen in the vicinity of fresh water only where a small creek empties into the sea, and were then supposed to be there for the purpose of obtaining fresh water to drink. The food of the Eiders is of an animal nature. They dive and obtain most of their food from the bottom of the bays and coves. They remain under the water for a long time, and, while under, swim exasperatingly long distances.

The bird is very shy except when on land during boisterous weather. At that time the natives of the western islands of the Aleutian Chain used small hand-nets to throw over the birds as they sat stupidly on the shore. A bright night with a hard gale of wind was the best time to secure them. The birds then sit in a huddle and many are caught at one throw of the net. The natives assert that the common Hair Seals catch these birds when on the water and drag them under to play with them; hence, these birds are constantly on the alert for seals and take flight as soon as a seal is discovered near.

The young male Eiders assume the adult plumage completely only at the beginning of the third year.

The Eskimo name of this bird is *mi't hŭk*, and is derived from the dull, hissing sound uttered by this species when disturbed.

162. SOMATERIA SPECTABILIS (Linn.). *King Eider.*

The King Eider is not common in the vicinity of Saint Michael's during the summer. It is more abundant in spring and fall. It breeds sparingly at Saint Michael's. I never obtained its nest, but saw the birds under circumstances that cause me to assert that it breeds there.

It occurs among the eastern Aleutian Islands, more abundantly in winter than in summer.

The nesting habits of this species are identical with that of *V-nigra.*

163. OIDEMIA AMERICANA (Sw. & Rich.). *American Scoter.*

The American Scoter arrives at Saint Michael's by the 1st of June and remains until about the last of October, or when the icy slush begins to form on the sea. They are not plentiful, at least in that immediate vicinity. A few miles further up the coast they are more abundant.

Along the shores of Aliaska and the waters of Bristol Bay I saw numbers of these birds in 1878, but under such circumstances that I was unable to obtain them.

Among the Aleutian Islands they are to be found throughout the year, though more plentiful during the winter, and breeding sparingly along the entire chain.

They are not gregarious, rarely more than three or four together; and often only solitary. When alone they are easily approached if the bidarka is directed so as to pass them at a few rods. They often dive and remain under water an astonishingly great period, and frequently never appear in sight, though the water may be perfectly calm and allow careful search.

The male is noted for the gibbosity of pinkish-white near base of bill; the lower edge of the swelling is deep red, gradually blending with the black of the rest of the bill.

The flesh is excellent during the winter. They feed on mollusks and other animal life; yet the flesh does not acquire a strong taste.

The Russians call this duck *Turpán.*

165. OIDEMIA DEGLANDI (Bonap.). *White-winged Scoter.*

I found this Scoter to be rare in all localities visited by me. It does not occur except sparingly among the Aleutian Islands that I could discover.

A single specimen was obtained at Saint Michael's. I know nothing of its habits.

Another individual of this species was procured April 20, 1879, at Unalashka Island and incorrectly referred to *O. fusca* Linné, but upon more careful examination it proved to be this species.

166. OIDEMIA PERSPICILLATA (Linn.). *Surf Scoter.*

The Surf Duck is common in all localities of the Yukon district bordering on the sea, but becomes more abundant to the southward.

It is common among the Aleutian Islands. It frequents the larger coves and bays, where in favored situations this bird is abundant in winter.

It is rather shy, but when single or in pairs it may be approached to within long range. The favorite way to obtain this duck is to wait until it dives, then to go to where it will come up. It is then so confused that ample time is given to obtain a shot at shorter range. When wounded this duck will dive and swim for two or three hundred yards. I have wounded them and waited for twenty minutes to have them reappear. They often sink to the bottom, as they die under water, and there is not sufficient air in their lungs to float them. If not this, there is always some big fish that accompanies the hunter and takes the bird only after it has dived under the water.

Unless the bird is killed outright there is but little chance to obtain it.

They have a peculiar habit of stretching up their necks as though they had some throat disease like the "gapes" in the young chickens.

The flesh of this duck is very nice, and if well prepared is excellent food, being free from any strong odors. Its food is obtained from the bottom of the bays and coves, and consists almost entirely of shell-fish and worms that are found among the rocks.

The Surf Duck is the *Svēstún*, or Whistler, of the Russians.

169*a*. CHEN HYPERBOREA (Pall.). *Lesser Snow Goose.*

The White or Snow Goose arrives in the Yukon district early in May. It is usually contemporary in its arrival with the White-fronted Goose and the Northern Crane (*G. canadensis*).

It occurs only sparingly in the vicinity of Saint Michael's, and remains but few days until it goes farther north. I am not aware that it breeds south of the Arctic Circle. They do not return along the coast in the fall by way of Saint Michael's. They are usually on the wing by 10 o'clock of each day, and to procure these birds one must seek them at early dawn while they are feeding

Their flesh is only tolerable eating, it being lean and has a peculiar odor.

This is the *Baily Goose* (White Goose) of the Russians.

It is not known to winter in any part of Alaska. It does not occur on any of the Aleutian Islands, even during the migrations.

171*a*. ANSER ALBIFRONS GAMBELI (Hartl.). *American White-fronted Goose.*

This species of goose arrives at Saint Michael's as early as April 25 in favorable years, and rarely later than the 10th of May in any year. By the 25th of May they are abundant.

It inhabits the fresh-water lagoons, and is essentially a vegetarian. The only animal food found in their crops was aquatic larvæ and insects. I am not aware that it eats shell-fish at any season of the year. The young grass shoots found in the margins of the ponds form its principal food.

It breeds in greatest numbers on the Yukon Delta. The young are attended by the parents until the former are able to fly in late August.

These geese remain in this vicinity until the sharp frosts in October freeze the margins of the ponds.

I have never observed this species of goose on the Aleutian Islands. They probably never visit the islands lying west of the mainland, as that region does not contain their particular food in sufficient quantity to induce them to visit it.

The flesh of this goose is excellent for the table, and they become very fat in the fall of the year.

At Saint Michael's this species of goose is called in Russian *Tún dri na Goose*, or Low-ground Goose.

This species does not winter in any part of Alaska.

172. BRANTA CANADENSIS (Linn.). *Canada Goose.*

The Canada Goose is not common on the coast. A few stragglers are shot during the spring migrations. It occurs along the upper Yukon River region, and seems to prefer the interior rather than the vicinity of the coast. The Canada Goose is not known to occur on any of the Aleutian Islands.

172*a*. BRANTA CANADENSIS HUTCHINSII (Sw. and Rich.). *Hutchins's Goose.*

Hutchins's Goose is one of the most abundant of the geese that occur at Saint Michael's. They arrive in early May and breed all along the coast lowlands. They are especially abundant around the Yukon Delta and lowlands back of Cape Romanzof.

Their nesting habits are the same as that of the other geese of the genus.

The flesh of this species is excellent food in the fall when they are fat.

On the Aleutian Islands they are especially abundant to the westward of Unalashka, and breed by scores on Atkha and in thousands on the Nearer Islands, being so intimately associated with *B. canadensis minima* as to be indistinguishable in their habits.

172*c*. BRANTA CANADENSIS MINIMA Ridgw. *Cackling Goose.*

The White-cheeked Goose is the first one of its kind that visits the vicinity of Saint Michael's, and arrives about the 1st of May, or even earlier. It is the commonest of all the geese that abound there. It breeds all along the coast of the Yukon district, but is reported to be rare in the interior, its place there being taken by *B. canadensis hutchinsii*. It is also abundant on the Aliaska Peninsula (north side), Bristol Bay, and the lowlands of the Nushagak River district. It may breed at Unalashka Island, but if it does it is not to my knowledge after repeated inquiry on the subject. The westernmost of the Aleutian Islands is also a favorite resort in summer for it. It breeds in greatest abundance on the Semechi Islands and Agattu Island of the extreme western islands. The Semechi Islands are especially adapted as breeding-grounds. They lie in 174° E. longitude, and are low and level, covered with marshes and lagoons rank in aquatic vegetation, among which the geese breed in thousands.

The upper Yukon District, the Yukon Delta, and south to the Bristol Bay District are fairly alive with them in the breeding season. They remain in this locality until about the 1st of October, while in the Aleutian Islands they remain until the middle of November. This bird does not winter in any part of Alaska. The clutch of eggs varies from seven to thirteen, and are laid in a carelessly-arranged nest composed of dead grasses and few feathers. The young remain with the parents until the latter molt, by the 20th of August, by which time the young are able to fly. This date witnesses a few of the older young and adult males coming from the breeding-grounds on the Semechi Islands to the island of Attu. The geese have exhausted, by that time, the food supply of that place, and repair to Attu to feast on the berries of the *Vaccineum* that are rapidly ripening. Attu Island has a great many Blue Foxes (*V. lagopus*) on it; hence is resorted to only by adult birds. The birds arrive poor and lean, but by the 10th of September they abound in thousands, and are very fat at this time. The birds usually alight on the hillsides, and quickly strip the lower areas of the berries that have ripened earlier. Toward the evening the geese resort to the shallow pools (destitute of vegetation, with gravelly bottoms) on the sides of the mountains.

After a certain holiday of the Greco-Russian Church in September, the natives know that the geese have become fat, and every one has prepared himself to hunt them.

Their miscellaneous assortment of guns—from the old-style Russian spill-out shotgun to the modern thin-barreled American or Belgian shotgun, that kicks as hard behind as it shoots ahead—is carefully dissected. A new tube perhaps is added, but of uncertain fixity of purpose, as it often flies out at times least expected. The breech-pin is taken out and carefully scoured and oiled. In the absence of screws a few thongs of sinew will secure the parts together, and, tightened by means of small wedges of wood, give solidity. It is a ludicrous sight to see an Aleut youth handle a gun of this description. He tries to hit a mark with a large number of shot and but little powder to give them force. He misses the mark, but consoles himself that the gun was fixed up to kill geese. But the younger ones of the youths rarely kill a goose, as they have not yet acquired the native cunning of the elders which enables them to secure more by this means than by relying on the good shooting qualities of their gun.

The adult natives take to their canoes and go some distance from the village to hunt for several days at a time. They sometimes take the women along to gather berries and roots for winter's use. The men take a small supply of salt to preserve the geese until their return. When a sufficient number is obtained they take them home and salt them in an old barrel. Should they not be successful, and remain out for a long time, the birds become very rank from lack of sufficient salt to preserve

them. It makes but little difference to them if the goose is fresh or stale. I once remarked to a native that he was salting geese that were far advanced. He replied that they did not ask in winter, when food was scarce, whether food stinks or not.

The manner of shooting geese at Attu Island is different from that pursued in other localities.

In the evening the geese repair to the shallow pools to preen their feathers and be secure from the attacks of foxes. These resorts leave unmistakable signs of the presence of geese of preceding nights. The native wanders over the hills until he finds a lake where "signs" are abundant.

Every preparation is made for camping out a night or two. A pair of long boots, made of seal-skin and water-tight, are taken. A long sort of shirt (called a *kamlayka*), made of the intestines of the sea-lion, is used as a water-proof against rain and the wet of the rank vegetation of the low-grounds.

A hut is generally to be found near the favorite night haunts of the geese. To this one journies in a canoe; and, on arriving the *chynik* (tea-kettle) is hung on the soon-kindled fire to boil, as the *chypeet* (tea-drinking) is a certain concomitant of all Alaskan jaunts, either of pleasure or of profit. The chypeet over, the approach of dusk is awaited. The hunters then seek the chosen ponds and secrete themselves in a gully, or on the hillside near the place selected to watch the geese as they come in for the evening; for during the day the geese have been feeding on the smooth, sloping hillsides.

The hunter is careful to approach these lakes, lest he leave a foot-print or other sign of his presence, as the goose is ever on the alert for such traces and forsakes any lake that is suspected. They will in such cases hover round and round, endeavoring to discover danger, and when satisfied that the lake has been visited by man, or that he is present, their loud cries give warning to all the geese within hearing, as they quickly stream off and away to the head of the ravine from which they came. After such an occurrence the hunter would just as well go home, or seek some other locality, for no more geese will visit that lake until the next night.

A night on which the sky is partly clouded and a light wind is blowing is the best. If the air is calm, and the night bright, the still water reflects too strongly the outlines of the surrounding hills, making the water inky black and renders it impossible to distinguish a goose sitting on the water.

At the time the geese are expected, each person has selected his place and remains quiet. On the approach of the first flock for the night a low whistle from the hunter to his companion gives signal. A low *hŭnk*, *hŭnk* of the geese and a swirl of wings announce their approach. A straight dash, or a few circles round the pond, and they settle. Shoot just as they alight and again as they rise. Sometimes they become so confused as to enable the holder of a breech-loader to get four shots at a single flock. The dead geese serve as decoys, and soon many are added to those already killed. The gentle wind slowly blows them ashore, while you are waiting for others. In a short time a sufficient number is obtained. At an appointed time another native comes from the hut to help bear home the geese.

Another method is still pursued at this place, but as it is being superseded by the use of the gun it will not be out of place to record it, as it is now adopted by the older men alone.

A net is prepared in the following manner: Strips of whalebone about three feet in length are tied by cords at intervals of two inches apart, so that the length of the net may be thirty feet and three feet high. The net is placed edgewise on the margin of a pond frequented by geese in October. A stout cord is secured to the end of the net, and firmly fastened to a peg in the ground. The other end is secured in like manner. A long cord reaches from the middle and top of the net to the owner who sits a convenient distance off to be out of sight by the geese. On the approach of a flock of geese to the pond they are not alarmed at the net, as the strips of whalebone stand on end and resemble grass-stalks. They swim near the net; and, when sufficiently near, the cord held by the man is jerked by him and causes the net to be thrown on the geese. The interstices of the net entangles their heads, necks, and wings so they cannot fly. The hunter runs out to twist their necks and again sets his net for another flock. This method was employed almost entirely before the use of guns became general.

In the earliest times, and before the advent of the Russians, they used another means to procure birds of all kinds, but especially geese and ducks.

The beach was searched for three rounded stones of near equal weight and size, generally about one and one-half inches in diameter, though this differed with each individual's strength, women the also using lighter stones than those used by the men.

After the stones had been selected a groove was cut round the stone and deepened sufficiently to hold a strong thong of seal-skin about twelve inches long. Each stone was thus prepared with the thong securely tied to it. The three loose ends of the strings were then tied together, so that the distance between two outstretched stones was about twenty inches. The strings were then taken by the knotted ends and laid carefully in the palm of the hand. The stones that are attached to the other ends of the strings were carefully disposed on the coiled thongs in the hand. A flock of geese that came within distance would have this *bolas* thrown at them, and was certain to become entangled on the neck or wings of some goose, which fell to the earth and was immediately secured. The women were adepts at throwing these stones. An old woman told me that she had often secured two and occasionally three geese at a single throw.

About the 1st of October the geese are so fat that they frequently burst the skin on their breast when shot and fall to the ground. During the summer the geese are not molested. The natives take many of the young and domesticate them. I have seen as many as fifty young ones at a time at Attu Island, owned by the natives, to whom the goslings become much attached, especially those who attend them. The goslings remain at large during the winter, but have to be fed during severe spells of weather. The house-tops being covered with sod, the excessive heat within causes the grass-roots to continually send out new blades of grass. The geese are constantly searching every house-top to find the tender blades. One man had a pair of adult geese which he assured me had been reared from goslings, and that they were then entering the sixth year of their captivity. These two geese did not breed the second year of their life, but that every year thereafter they had reared a brood of young, and brought them home as soon as hatched The wings and half of the tail feathers had to be clipped every season to prevent them migrating In the fall of 1880 this pair of geese went away and were gone so long that the man supposed they would not return. After some time they returned, and on catching them, to clip them, it was found that the male had a shot-hole through the web of one foot and a second hole in the other leg. This, doubtless, made the geese think "there is no place like home." This pair was killed later in the season.

As an illustration of the parental solicitude exhibited by these birds, I will relate that several years ago a heavy fall of snow occurred in the latter part of June at the islands of Agattu and Semichi, and covered the ground with more than three feet of snow. At that date the geese were incubating. The geese did not quit their nests, and were suffocated. The natives found scores of the birds sitting dead on their nests after the snow had melted

After the 15th of November these geese leave the islands and are not to be seen until the following April. At Atkha the people rear a number of the goslings of this species. The young are obtained from the islets lying contiguous to the larger islands in that vicinity. From the best information I could obtain this and Hutchins' Goose are the only species which breed on the Aleutian chain; and, none of them breeding east of Unashka Island. On Unáshka, Amlia, Atkha, Athákh, Kanága, Tanága, Kiska, Bouldýr, Semichi, and Agattu are the greatest breeding grounds of the Aleutian Islands. On some of these islands foxes of various kinds are numerous, hence, while they are excellent feeding grounds for the geese in the fall, the geese are compelled to rear their young on the nearer islets, where the foxes cannot molest the young goslings, unless there happen to be lakes containing small islands in them. There the geese are secure from foxes and other animals.

174. BRANTA NIGRICANS (Lawr.). *Black Brant.*

The Black Brant arrives at Saint Michael's from the 5th to the 15th of May; and, is usually about a week to ten days later than the other geese.

Along the eastern end of the canal, which separates Saint Michael's Island from the mainland, this Brant is seldom seen; and then either singly, or in small flocks of less than a dozen individuals; and these are apparently stragglers from the great stream that pours northward between Saint Michael's Island and Stewart's Island. Three or four days after the appearance of the first arrivals,

the low grounds, bordering the strait between these two islands, were in former years, a favorite place for shooting these birds; for here they flew but few yards above the ground. As many as a hundred and fifty were obtained in a single morning's shooting. In later years they have become much less numerous in this particular locality. Their flight was directed to the Kavyayak Peninsula, north of Norton Sound. They do not remain on flight more than a week or ten days, in their migration, in spring. The natives living on the south side of that peninsula assert that this bird does not breed there, but continues its flight to the Arctic regions. They do not breed in the Yukon district, but return in the fall by the way of the interior, for but few are then seen.

This species does not occur on the Aleutian Islands to my knowledge.

The flesh is not good, as the birds are so lean in the spring that they are strongly flavored. They are eaten by the Russians and natives.

The Russian name of this species is *Nĭmké*, when used in the plural number.

176. PHILACTE CANAGICA (Sevast.). *Emperor Goose.*

This beautiful goose is found in all parts of Alaska within the following boundaries:

Cook's Inlet for the eastern, the peninsula of Aliaska and islands to the south of it for the southern boundary, and extending to Attu Island, which forms the western limit. The northern boundary includes the Aleutian Islands, Pribylof Group, and Saint Lawrence Island, then across eastward to Saint Michael's, on the mainland.

The habitat of this goose is strictly littoral-maritime, frequenting only the reefs, rocks, and shoals of the salt water and the brackish lagoons of the mainland coast. It is never found in fresh-water localities, excepting those contiguous to the sea, such as the lower Yukon Delta, mouth of the Kuskokvim River, and the bars lying off the mouth of the Nushagak River. It is most abundant in the vicinity of Kothlik, on the northern edge of the Yukon Delta; the tide lagoons near Cape Romanzof and those at the mouth of the Ugasik River on the north and east end of the peninsula of Aliaska, on Sannakh Island, and some of the Aleutian Islands.

The more northern localities mentioned form the summer habitat and breeding grounds, while the entire south side of the Aliaskan Peninsula and the Aleutian Islands form the winter resort.

The migration to the northward begins in April, after the middle of the month. A constant stream of these geese pour into the lagoons, on the north side of the peninsula, in the neighborhood of Ugasik. They remain there until the snow and ice begin to clear from their breeding-grounds, on which they arrive by the middle of May or early part of June. By the middle of June incubation has begun. A slight depression in the ground, lined with few stalks of grass and few feathers from the parent bird, forms a nest in which are deposited seven to eleven eggs of a soiled white, or sometimes with dots of pale olive. The presence of the dottings on the shell is extremely variable, as even eggs in the same nest will be without them, or sometimes only one part of the egg will be so marked. The period of incubation was not determined. The young leave the nest as soon as hatched and remain with the parent birds. The former are able to fly by the first week in September, as a young bird was killed by me at Saint Michael's on the 9th of September, 1874. It was the only one of its kind ever obtained in that immediate locality. A few miles to the south of that place the bird becomes numerous.

In the month of October, usually from the 7th to the 20th of the month, a strong north-northeast wind blows, attaining at times a strong gale rate. This constant wind has the effect of lowering the waters of Norton Sound to a remarkable degree, sometimes as much as eight feet below the lowest water of other seasons.

At this period the Emperor Goose visits the vicinity of Stewart's and Saint Michael's Islands in great numbers to feed on the shell-fish exposed by the low water. By the 15th of November the rocks are covered with frozen slush. The geese then depart for the south side of the peninsula and the Aleutian Islands. They arrive at Unalashka by the 1st of December, and remain until the next April.

In Captain's Harbor (Unalashka Island) several reefs are frequented by them during the night and early morn.

On Athakh, Kanaga, Tanaga, Amchitka, and Kiska Islands they are plentiful in January, February, and March. At Attu these geese arrive in the latter part of December and remain until

the latter part of March. They are, however, not so abundant on the extreme westward islands of the chain.

They do not breed on any of the Aleutian Islands.

The flesh of this goose is coarse, besides having a very disagreeable odor and fishy taste. The latter can, in a degree, be removed by stripping off the skin and letting the body of the bird freeze over night. When well roasted it is tolerable food. Several plucked birds were brought to me from the Semichi Islands by natives, who had repaired thither to hunt sea-otters; and in the absence of other fresh food the flesh of the Emperor Goose formed an acceptable change.

The bird is very shy; and, as it frequents only the most exposed rocks, is difficult to approach openly. They are oftener obtained as they fly unwittingly over a concealed hunter.

It may be well in this connection to add that the Russian name of this particular goose is *Sa sár ka.* Many persons, having but a limited knowledge of the Russian language, and more ignorant of the rules for pronunciation and the sounds of the consonants, have presumed that the word *Sa sár ka* is referable to the word *Tsar*, meaning Emperor, or to the word *tsarskie* (an adjective derived from *Tsar*), signifying pertaining to a *Tsar*.

The word *Sa sár ka* is nothing more than the Russian word for Guinea Hen, *Numidea meleagris.* A certain resemblance of the two birds in coloration is obvious, hence the application of the name in question.

Another remark may not be out of place. Along the Aleutian Islands the name of this bird in Russian is "*Lídenna Goose*" (Beach Goose), while at Saint Michael's the "*Lídenna Goose*" is the White cheeked Goose, *B. canadensis hutchinsii*, and this bird among the Aleutians is called the "*Túndrina Goose;*" and again at Saint Michael's the "*Tundrina Goose*" is the *A. albifrons gambelli*, or American White-fronted Goose, a bird that does not, to my knowledge, occur on the Aleutian Islands. The specific name of this bird was a curiosity to me, and after much trouble I succeeded in finding the following article in the Nova Acta Academiæ Scientiarum Imperialis Petropolitanæ, tomus XIII, 1802, p. 346: "Description d'une nouvelle espèce de Canard et d'une variété de l'Huîtrier, qui se trouvent dans le cabinet d'histoire naturelle de l'Académie Impériale des Sciences, par l'Adjoint Sewastianoff. Présenté et lu le 8 octobre 1800."

After giving a description and measurements of this species the article, on page 349, gives the probable origin of the specific name:

> Ce canard, dans le Catalogue des Oiseaux apportés par Mr. Billings, porte le nom systématique d'*Anas canagica.* Il est très probable que cette nouvelle espèce a été découverte par Mr. le Capitaine Billings sur l'île Canaga, ou Kyktak, une des îles Aléoutes la plus proche des côtes de l'Amérique septentrionale et située derrière le cap Aliazka, et que le nom de l'espèce, c'est à dire *Canagica*, a été imposé à cet oiseau du nom de la première île, ou de celui des principaux habitans de l'île Kyktak appelée *Caniagues* ou *Canagues*, qui, peut-être ayant apprivoisée cet oiseau, l'ont rendu domestique.
>
> Ces sont les sauvages très belliqueux et que les Russes, dans un second voyage entrepris par Schelichoff, avoient beaucoup de peine à se soumettre.

Near longitude 177° west of Greenwich lies the large Aleutian island called *Kanaga.* This island could have been referred to in the above description, but as it says that the island is situated behind, "*situé derrière le cap Aliazka,*" the peninsula of Aliaska, the island now called Kadiak is doubtless referred to. The original Innuit name of Kadiak was *Kaniag* or *Kanaguk.* The name *Kyktak*, as used above, is simply one of the many forms of spelling of the Innuit word *Kikhtŭk*, meaning island.

The geese form an important article of food in the Yukon District, alike to the white and native population. They are mostly obtained by means of the gun.

The best localities near Saint Michael's are toward the western end of the canal, along the edge of the low grounds bordering the hills of the mainland, and near the village of Stephansky (Athwik, native name), on the western side of Saint Michael's Island. This area is low, intersected with innumerable swamps and connecting streams, forming a fine feeding-ground for all kinds of waterfowl.

A regular camping outfit is taken by sledge and dogs to a chosen locality. In the early morning a site is selected where the geese fly round some ending of a hill range, for they fly low and prefer to sweep round the hills rather than mount over them. They are frequently so low in their

flight that the hunter has to wait until the geese are well past before he can shoot them to an advantage. A nearly constant stream of geese fly round a certain point, just to the left of the Crooked Canal, on a slight eminence, formed from the deposit of soil torn up by some immense ice cake, which the high tides of some December in years long gone by, had left as the water receded and the warm weather of spring had melted; now overgrown with patches of rank vegetation.

At a convenient distance a native prepares a fragrant pot of tea, with slices of bacon and some hard bread, to be eaten when a surfeit of sport caused one to think of else than the slaughter of geese and ducks.

By ten o'clock the geese were done flying for that morning. The low character of the ground did not favor approach to the geese feeding at the ponds. During the middle of the day a quiet sleep invigorated the hunter for the late evening shooting. The latter generally affording a less number of geese than the morning's shooting.

By the next morning a sufficient number of geese were obtained to heavily load a sledge; drawn by six, lusty Eskimo dogs, assisted by two sturdy natives. This sport generally lasts from the arrival of the geese until the first week of June. At this time they repair to the breeding-grounds. During the summer the geese are not hunted. The eggs are eagerly sought by the natives and whites and take the place of meat of the birds. In the latter part of August or the early part of September the fall shooting begins, as the geese have moulted, the young are able to fly, and they are fattening on the ripening berries. The geese are now obtained by watching the ponds, or as they fly over in small flocks or singly. Should a flock not fly sufficiently near, a favorite method to attract their attention is for the hunter to lie on his back, swing his arms and hat, kick up his legs, and imitate the call of the geese. It rarely fails to bring them within distance, and may, if several be just shot from their ranks, be repeated, and even a third time. Later in the season, when cool and frosty nights are regular, great numbers of the geese are killed and disemboweled for freezing to keep throughout the winter. The feathers are left on the birds, for the flesh is said to keep in better condition. The body is washed out and the bird hung up by the neck in the ice-house to keep, even until the geese have arrived the next spring. The flesh, when thawed out slowly, has lost all the rank taste, and, in my opinion, is much improved by the freezing process.

I have eaten the flesh of all the various kinds of geese, frequenting those northern regions, and place them in value of flesh as follows: White-fronted Goose, *A. albifrons gambelli;* White-cheeked Goose, *B. canadensis hutchinsii* and *B. canadensis minima;* Canada Goose, *B. canadensis;* Black Brant *B. nigricans*, and is always tough and lean, fit food only for a Russian; Snow Goose, *Chen hyperboreus*, is scarcely fit for food, except in cases of necessity. Its flesh is coarse, rank, and has a decidedly unpleasant odor; the Emperor Goose, *P. canagica*, is scarcely to be thought of as food. There is a disgusting odor about this bird that can only be removed in a degree, and then only by taking off the skin and freezing the body for a time. Even this does not rid the flesh entirely of its strong taste.

180. OLOR COLUMBIANUS (Ord). *Whistling Swan.*

The Whistling Swan is a common bird in the Yukon district. It arrives about the 1st of May, or in open years two weeks earlier. The Swan and the Great Gull, *L. barrovianus*, are nearly contemporaneous in arrival. They do not arrive in large flocks, but rather in a straggling manner of one, two, or three at a time, and rarely are seen in greater numbers than half a dozen at a time.

It breeds abundantly along the lowlands of the coast. The eggs are one to three in number, placed in a tussock of grass that grows in a pond away from the margin of it. The eggs are soiled white to slightly fulvous in color. The young are able to leave the nest by the first week in July, and fly by the middle of September. They migrate about the middle of October, and at this time the migration is invariably to the northward from Saint Michael's, and directed toward the head of Norton Sound. As many as five hundred may form a single line, flying silently just over the shore line at a height of less than 600 feet. I always suspected that these birds flew to the northward as far as the Ulúkuk Portage, in about 65° 30′ north latitude, so as to get to the Yukon River at Nulato, about 120 miles in the interior of the Territory, and continue their flight up the Yukon River, which would in its course let these birds more easily cross the Rocky Mountain ridge with

least effort. This is supported by the fact that I never saw Swans, at any season of the year, migrating to the southward.

The Swan is found on the extreme western islands of the Aleutian Chain in winter, and occasionally it is reported as having been seen in winter on Sannakh Island. At Attu Island a large flock was seen in a lake, just back of Massacre Bay, on the south side of the island, in April, 1881. They were very wild and remained for only a week.

In former years quite a number of swan skins were annually exported from Saint Michael's. The flesh of this bird is not palatable. A young bird is only tolerable. The eggs are coarse, oily, and rank. The feet, bill, and iris are black. The bill has a yellow spot on it.

205. GRUS CANADENSIS (Linn.). *Little Brown Crane.*

The Little Brown Crane is one of the earliest arrivals at Saint Michael's, it being in advance of the Geese and nearly contemporary with the Swan. The earliest date of its arrival was May 2, 1875. A few birds usually come in advance of the main body; where, if they reach the grounds too early, they pass most of the time on the wing. By the middle of May hundreds of them may be seen on the low grounds.

During the mating season they execute the most surprising antics. They assemble on some level place; and, amid their deafening croaks, there perform a series of motions very similar to a quadrille as danced in the rural districts.

The nest is placed on a tussock of grass, which may grow on an islet of some pond. The number of eggs is one or two. The young are hatched by the 10th of July. The young remain in the downy stage until the autumnal moult. They remain in this locality until the latter part of September. Their flesh is considered tolerable eating, though it is strong unless the bird is young.

I have been informed on good authority that these birds pass over the entrance of Cook's Inlet in thousands, in April, on their way to the northward.

I have never seen nor heard these birds on any of the Aleutian Islands. The natives of Attu assert that several years ago one was killed in October on that island. It was doubtless a storm-driven straggler.

222. CRYMOPHILUS FULICARIUS (Linn.). *Red Phalarope.*

The Red Phalarope arrives at Saint Michael's about the 1st of June. They are not abundant at any time, except during the early part of June. They are more frequently seen on the mainland, opposite the Redoubt, than on the island of Saint Michael's. They depart from this locality by the end of August. They breed near here, but eggs and nest were not found. In the neighborhood of the Yukon Delta they are abundant throughout the summer. Their habits, on the land and lakes, are identical with that of *P. lobatus*. In the early part of June, 1878, I was on a vessel going to the Kuskokvim, Bristol Bay, and other places in that vicinity. I frequently saw large flocks of these birds alight in the sea to pick up such food as minute mollusks, or following the wakes of sea-lion troops, or that of a whale. At times they were so close to the vessel that they could have been caught with a dip-net. When seeking a locality abounding in food the flocks of these birds are constantly wheeling spirally upward and outward for two or three hundred yards, and again dart to the water or again start upward in the same manner.

They utter all the while a sharp *tweet*, and when sitting on the water are exceedingly graceful; their bodies so buoyant as seemingly not to touch the water. They rarely progress on the water in a straight line, a few inches forward and a turn to right or left, and again to right or left.

I saw but few of these birds at Nushagak. At the mouth of the Ugasik River, and the low grounds surrounding it, I saw hundreds of these birds.

I have no record of their occurrence on the Aleutian Islands. They may occasionally occur there with the other species.

A belated individual of this species was killed October 14, 1876, at Saint Michael's. A fierce snow-storm was raging at the time. The specimen was in the winter plumage, and as it flew by me its bewildered actions reminded me of a bat.

The iris is reddish-brown, tarsi, toes, and lobes of web flesh colored, joints bluish. Bill yellowish, tipped with black.

223. PHALAROPUS LOBATUS (Linn.). *Northern Phalarope.*

The Northern Phalarope occurs abundantly at Saint Michael's. It arrives by the 25th of May, though the earliest record of this species was May 13th. This species frequents the shallow pools and margins of the lakes, seeking its food among the sedges and other aquatic plants. It swims among them, or creeps over the little knots of grass. Their food consists entirely of aquatic worms, slugs, larvæ, and flies.

They breed in June. The nest is placed among the grasses and consists of a lot of grass blades arranged with little care. Four of five eggs of greenish ground, thickly blotched with dark are laid. The young are able to fly by the first of August. The female of this species is noted for having a brighter pattern of coloration than the male, and is somewhat larger in size. This species is widely dispersed, and apparently abundant throughout the Yukon district. It occurs far up the Yukon River. On the coast it abounds in the lower portions. Hundreds of them were seen on the low grounds on the northern side of Aliaska. On the Aleutian Islands this species was not observed at Unalashka. On the western islands of the Aleutian Chain it is abundant. Many breed on Atkha, Amchitka, Semichi, and Agattu. At Amchitka they were very numerous among the little streams which form the outlet of the inland lakes. They remain until October on these islands and return in the latter part of April. The iris of this species is variable, a reddish brown to nearly black, the bill is black with lighter base, tarsi and toes bluish with dark joints.

The Attu people call this bird *Chi't khŭkh* and is derived from the note.

230. GALLINAGO DELICATA (Ord). *Wilson's Snipe.*

Wilson's Snipe arrives at Saint Michael's early in June, or even in the latter part of May, if the season is sufficiently open. It is common enough, though more often heard than seen. They frequent the more broken higher parts of the lowlands, and always in the vicinity of the larger ponds of fresh water, where they seek their food among the sedges and other aquatic grasses. This Snipe is not shy, and relies more on hiding in the grasses than taking to flight. Early in the morning or late in the night (during the long twilight which prevails from the middle of May to the middle of July in this latitude) is the best time to find these birds on the ground. During these hours they will scarcely fly, unless suddenly startled, but will run along over the ground, and may be *driven* for quite a distance, especially in the breeding season, before they fly.

During the day these birds are mostly on the wing. In the breeding season the males fly high (at times undiscoverable) in the air over the location of the nest. Their wings make a peculiar noise—*huttle, huttle*—continued for half a minute at a time and repeated at short intervals. This sound is very deceptive, and long search often fails to discover the bird.

This Snipe remains until the middle of September, and becomes very fat at that season.

I have seen this bird at the mouth of the Kuskokvim River in June, 1878, and at Nushagak, on Bristol Bay, in the same month. It was not observed on any of the Aleutian Islands.

232. MACRORHAMPHUS SCOLOPACEUS (Say). *Long-billed Dowitcher.*

This Snipe arrives at Saint Michael's after the middle of May, usually about the 20th of the month. It is common in certain localities on the island of Saint Michael's, and more plentiful along the lower end of the "Canal" and neighborhood of the Yukon Delta. It prefers the muddy places and slimy edges of the smaller pools. It is rarely found among the sedges and other grasses, resorting to these places only in the breeding season. It is rare that more than one individual is seen at a time. The nest and eggs were not discovered, though the bird breeds in this vicinity, as it was observed throughout the season until August.

I observed this Snipe near the Kuskokvim River in June, 1878. I have never seen it on the Aleutian Islands; and, from the physical character of those islands, doubt that it occurs there.

234. TRINGA CANUTUS Linn. *Knot.*

The Knot arrives at Saint Michael's by the 25th of May. It breeds along the coast in this vicinity among the grassy swamps.

I did not see the eggs or nest. It is quite common early in June, but retires to the more secluded places by the middle of the month. The specimens obtained by me did not vary from the

following: Length, 10.5; expanse, 20.5; wing, 6.75; tail, 2.75. Iris, bill, and feet black. I have not observed this bird west of Ugasik, on the eastern end of Aliaska, where it was quite plentiful in the latter part of June, 1878.

236. TRINGA COUESI (Ridgw.). *Aleutian Sandpiper.*

The Aleutian Sandpiper arrives at Saint Michael's early in May of each year, and in considerable numbers, being generally, on their arrival, in the dark plumage, which is changed for the summer by the first of June in this locality. On their appearance they are strictly littoral-maritime, resorting to the larger bowlders and rocky shelves covered with seaweed, among which these birds industriously search for slugs and other marine worms. Usually several birds are together, rarely singly, and seldom over eight or ten in a flock. It is not at all shy, depending more on its color to hide by squatting among the crevices of the dark lava-rocks and thus be unobserved. When cautiously approached these birds generally run to the highest part of the rock or bowlder which they are on then huddle together before taking flight the moment after. This habit allows them to be nearly all killed at a single discharge of the gun. The native boys, having observed this habit of these birds, procure a club about two feet long, and when the birds huddle together, before taking flight, the club is hurled in such manner as to sweep all the birds off the rock. This manner of procuring these birds is practiced by the western Aleut boys to a great degree. By the middle of June it is rare to see one of these birds in the winter plumage. On assuming the summer plumage the habits of the birds are entirely changed. They build their nests on the dryer places of the marshy ground and are usually seen either singly or in pairs. The nest is comfortably made of dry grasses and a few feathers placed on a small dry tuft of grass growing, perhaps, surrounded by water. The young are able to leave the nest by the 10th of July. The number reared in a nest is four or five. They follow their parents until they assume the winter plumage in the latter part of August or September, or even later. The males are much devoted to their mates while incubating, and I have every reason to believe that the male does the greater part of the labor of incubating, as they were the ones generally found either on or near the nests. When alighting near the nest either sex has the habit of raising its wings perpendicularly and slowly folding them, all the while uttering a trilling peep continued for several seconds.

This species seems to be most abundant among the Aleutian Islands in the winter season, although I obtained seven specimens in the breeding plumage at Atkha in June and July, 1879, and observed a few at Attu in the summer of 1880, and several pairs at Amchitka in June, 1881. At Unalashka they are quite numerous in Captain's Harbor. In the month of November these birds become very fat, and possess a delicate flavor when broiled.

239. TRINGA MACULATA Vieill. *Pectoral Sandpiper.*

A single specimen of this Sandpiper was obtained at Saint Michael's. It is quite rare, according to my experience. At Attu Island, on the 22d of September, 1880, I started up a species of Snipe which I had not seen before or since in the Aleutian Islands. It was in a small, but treacherous, swamp to which I could only approach the edge. The bird started up with a sharp *tweet*, and was away before I could fully identify it. I always suspected it to be of this species. I considered it to be a straggler, as I visited the same locality for others but failed to see more of them until the 29th of the month, when I secured three specimens in the same swampy tract and fully identified them.

243*a*. TRINGA ALPINA PACIFICA (Coues). *Red-backed Sandpiper.*

The Red-backed Sandpiper is one of the latest arrivals of the scolapacine birds. It rarely comes before the 5th of June. It is common; inhabits the lowest marshy tracts of the country. It does not wander into the interior, that I could discover. It goes up the Yukon Delta quite a distance, but prefers the neighborhood of the sea. I did not discover the nest or eggs, but it doubtless breeds abundantly, as it remains in this locality until the first week of October.

It was not observed on the Aleutian Islands, though it may occur on the eastern islands of the chain.

247. EURHYNETES OCCIDENTALIS. (Lawr.). *Western Sandpiper.*

The Western Sandpiper arrives at Saint Michael's by the middle of May. My earliest record was the 14th of May, 1875. Like many other of the limicoline birds its movements depend much on the opening of the slimy pools which it frequents. It is often associated with *P. lobatus.*

About the first of June it begins to build its nest among the dry mosses found on the low grounds; a slight depression in the moss, containing a few feathers. Four or five eggs are laid. The male assists in incubating, as the first specimen I obtained was a male, which fluttered from the nest as though he was wounded. His fluttering wings, low peeping note, and limping gait caused me to detect the nest almost between my feet.

While the female sits on the nest the male is constantly hovering over her, fluttering his wings with rapid strokes and uttering a peeping trill the entire while.

The young are hatched by the first of July and are able to fly in three weeks. I am not aware that more than one brood is hatched in a season.

By the first week in August these birds resort to the tide-swamps and muddy places along the beach.

They depart to the southward by the middle of September. There is great diversity in the length of the bill of this species. The bill is dark with lighter base. The iris black; tarsi dark. The males average smaller measurement than the females.

This Sandpiper is abundant in all the Aleutian Islands.

At Atkha and Amchitka it is extremely abundant.

At Saint Michael's it probably outnumbers any other wader individually.

250. LIMOSA LAPPONICA BAUERI (Naum.). *Pacific Godwit.*

The Pacific Godwit arrives at Saint Michael's about the first week in June. In this locality it frequents the banks of the numerous intersecting streams of the lowlands, and is especially abundant along the "canal."

This species probably breeds here, as it was observed during that season, although I did not obtain the eggs of this bird.

This Godwit is found on the Aleutian Islands in the latter part of May as it is on its way to the northward. On Atkha Island I obtained three specimens. They were on the sandy beach of the west side of Nazan Bay. They remain but a few days, and are probably stragglers from the main body of their kind.

At Amchitka I saw four of this species on May 24, 1881. They were in Constantine Harbor of this island.

I do not think they breed on any of the Aleutian Islands.

The flesh of this bird is excellent, being quite as large in body as the Green winged Teal.

255. TOTANUS FLAVIPES (Gmel.). *Yellow-legs.*

The Yellow-legs is only a straggler at Saint Michael's, and was seen only on two occasions on the beach in the early part of June.

I obtained a specimen at Fort Yukon, where it is not common. On some parts of the Yukon River it is said to be common, but not so according to my own observation.

I saw a specimen of this Snipe at Nushagak, on Bristol Bay, in the month of June, 1878. It was running along the muddy edge of the river. I had only time to identify it as it flew, and that before I got within distance to shoot it.

It does not occur on the Aleutian Islands that I am aware of.

259. HETERACTITIS INCANUS (Gmel.). *Wandering Tattler.*

According to my own experience I found the Wandering Tattler to be a rare bird in all parts of the Territory visited by me.

At Saint Michael's the bird arrives by the first of June and remains until the earlier frosts of the middle of September. It appeared to prefer the less frequented portions of the rocky shores where the crevices and rifts abound in the shelving rocks jutting from the edges of the islands and points.

Rarely did I find two or three of these birds even near each other, their habits rendering them peculiarly solitary. While not shy, yet they are not easily approached, for as soon as they detect danger they are apt to skulk, and rely upon their coloration of plumage to enable them to escape detection. I was informed by credible natives that this species has been known to breed on the small island (Whale Island) near Saint Michael's. Under the various circumstances which I observed this Tattler I could not doubt that it breeds in that vicinity. The Unalit term this bird *Tú va tá tŭk.* Among the Aleutian Islands it was observed once on Unalashka, several on Atkha, and twice on Attu.

264. NUMENIUS LONGIROSTRIS (Wils.). *Long-billed Curlew.*

A single individual of this species was seen in the marshes, west of Saint Michael's, toward the middle of the night of June 19, 1874. The bird was very shy. I succeeded in wounding it in the tip of the wing and came near securing it. It took flight and flew just beyond gun range each time I approached it. It finally flew beyond a hill, where I could not succeed in finding it. This is the only instance of its occurrence in that vicinity, and is remarkable that it should be found in that locality, for it was far north of its usual haunts. The great size of the bird, the extreme length of the bill and pattern of coloration could not cause me to mistake it for *hudsonicus*, which is not rare in that locality.

265. NUMENIUS HUDSONICUS (Lath.). *Hudsonian Curlew.*

The Hudsonian Curlew is not a common bird in the vicinity of Saint Michael's. On the Yukon Delta it is said to be quite common. I am not aware that it breeds in the neighborhood of Saint Michael's.

It does not occur on any of the Aleutian Islands to my knowledge.

266. NUMENIUS BOREALIS (Forst.). *Eskimo Curlew.*

A single specimen of this Curlew was obtained May 22, 1874, on shipboard about sixty miles west of Nunivak Island, Bering Sea.

The bird was much fatigued and made no attempt to fly when taken by the hand.

270. CHARADRIUS SQUATAROLA (Linn.). *Black-bellied Plover.*

This large Plover is not rare in the vicinity of Saint Michael's. It prefers the drier uplands, where it procures its food of insects and berries. They are seldom seen in flocks of more than a dozen; half that number being the more common, and pairs or couples quite as often. I found them always on the alert, and not easy to approach.

They occasionally occur in the spring migrations on the Aleutian Islands, the more abundantly on the western islands than those in the vicinity of Unalashka. I saw several on Sannakh Island in the spring of 1878, and also in late August of 1879.

The nests and eggs were not obtained. In general habits they are similar to the Golden Plover. They arrive at Saint Michael's by June 1st and leave by September 25th.

272*a*. CHARADRIUS DOMINICUS FULVUS (Gmel.). *Pacific Golden Plover.*

The Pacific Golden Plover arrives at Saint Michael's by the 1st of June or perhaps a few days earlier. It frequents the sides of the low hills as soon as the snow is melted. They are rarely seen in flocks, though several may be seen at a time scattered over the higher parts of the low grounds.

They feed principally on berries of the *Vaccineum* and *Empetrum* on their first arrival, as many of these berries do not dislodge until succeeding growths push them off.

A few of these birds breed in the vicinity of Saint Michael's, but eggs were not obtained by me.

In the fall these birds become very fat, and are fine eating.

I observed one of this species on Sannakh Island in July, 1878, and one was brought to me in plucked condition of body, but wing, head, and neck feathers remained on it; hence sufficient to identify it on the 17th of May, 1879, at Atkha Island. I also saw two of them on

the beach at Massacre Bay, on the south side of Attu Island, in the early part of October, 1880. I had no gun with me, so could not procure them. They were then (October 3) in their winter plumage.

274. ÆGIALITIS SEMIPALMATA Bonap. *Semipalmated Plover.*

A single specimen of this bird was obtained at Saint Michael's in the yard. It was shot October 1st, during a freezing rain. It was the fattest bird that ever came under my notice.

This bird does not appear to be numerous in this vicinity, although in the interior along the Yukon River it is plentiful and abundant at Fort Yukon, whence I obtained most of my specimens.

This species was not observed on any of the Aleutian Islands.

282. APHRIZA VIRGATA (Gmel.). *Surf Bird.*

The Surf Bird was not observed at Saint Michael's, though it doubtless occurs there during the summer. At Sannakh Island in 1878, and at Kadiak in 1881, I saw several individuals of this species, but under circumstances which rendered it an impossibility to collect them. It has much the same habits as *A. melanocephala.*

283. ARENARIA INTERPRES (Linn.). *Turnstone.*

The Turnstone is of more frequent ocurrence on the region about the shores of Bristol Bay, the Aliaska Peninsula, and the Aleutian Islands; perhaps more common on the western islands of that chain than to the eastward. I saw individuals at Attu, Amchitka, Atkha, and in the vicinity of Belkovsky village. What appeared strange to me was the fact that but one could be found at a time, and then most unexpectedly as it flushed from the crevices of the rough-edged shore; occasionally venturing along the sandy beach where the long waves roll slowly up and down the strand washing, here and there, a mollusk or crustacean from under the flat, thin stones, and eagerly seized by the birds ever on the alert for a morsel of food. In these situations the manner of the bird caused it to appear out of its usual haunts, hence timid and shy, taking flight long before one is within gun range; yet among the crevices of the rocks it often relies upon its coloration to conceal it from view. Its noise is not at all charming enough to be called pleasant; a rattling, discordant, harsh note, apt to startle one if the bird flushes directly from your feet.

I observed the bird at times and under such conditions that I could not doubt the proximity of a nest.

They do not arrive on the Aleutian Islands until the middle of May, and none were observed anywhere after the 1st of October.

284. ARENARIA MELANOCEPHALA (Vig.). *Black Turnstone.*

The Black Turnstone is one of the earliest arrivals in the vicinity of Saint Michael's. The 13th of May was the earliest date recorded. It arrives with the earlier geese, and for the first few weeks frequents the edges of the low ponds, which are the first to be freed from ice in spring. After the sea ice has left the shores it repairs to the rocky beach and seeks its food among the stones and seaweeds. It is ever on the alert for a venturesome slug, which may be exposed as the waves roll the stones back and forth on the beach. This bird then follows the wave until another causes it to retreat. They are often netted in these instances. They usually squat on the place where they may be when alarmed, but on taking flight they utter a rattling scream that is quite enervating when they are suddenly come upon. They are mostly solitary in their habits, rarely more than one is seen at a time.

I did not discover the nest and eggs of this bird, but it breeds along the entire coast of the mainland. I saw two of these birds at the mouth of the Kuskokvim River in June, 1878. They occur on the south side of the peninsula of Aliaska, as I saw one at Belkovsky in the early part of August, 1881.

They are reported to be plentiful on Unga Island and Sannakh Island. The sea-otter hunters both native and white, detest this bird as it frequents the places most resorted to by marine mammals and is certain to give alarm to the otter or sealt which he hunter is endeavoring to approach.

I did not observe this bird west of Belkovsky and believe that the island of Sannakh is its most western limit of range.

The natives of Unalashka, who go to Sannakh Island every year to hunt sea-otters, say that it does not occur at Unalashka and other islands west of the mainland.

287. HÆMATOPUS BACHMANI Aud. *Black Oyster-catcher.*

The Black Oyster-catcher is found on the islands of Alaska that lie south of the peninsula of Aliaska, as far east as the Shumagin Group, and to the westward as far as Kiska Island of the Aleutian Chain, and is a constant resident of this area. I observed this bird on the peninsula, but only on the south side of it. The low, marshy character of the northern side of Aliaska precludes the possibility of its occurrence there, as it invariably frequents the rocky reefs and water-washed rocks that lie out from the main body of the island or shore; and, is strictly littoral, never on any occasion going inland; and in its flight invariably flying over water.

The flight consists of a few rapid strokes of the wing, followed by a sail for a few yards. It is sluggish when on the wing, and flies with difficulty, and rarely long continued. When alarmed it flies over the water within few yards of the shore, and in going from one point of rocks to another it either makes the trip in easy stages from one large rock to another, or else follows the indentations of the shore line. The bird is always on the alert, and not at all shy. It generally sees the hunter long before he suspects the presence of the bird. The bird either squats in a depression of the rocks, or stealthily creeps to the top of some huge bowlder, where it utters a piercing, whistling chatter like that of a policeman's rattle. It causes the intruder long search to discover the presence of the bird, for its color is so near that of the rocks it frequents that it is not easily detected. The note is then answered by another bird, so that in a few minutes a dozen may be chattering hideously, making the hunter wonder where all the birds came from so suddenly, as all the birds within hearing assemble on the first note of alarm.

The Black Oyster-catcher is universally detested by both white and native hunters, as it frequents just those places most resorted to by seals and sea-otters, so that on the approach of a hunter to obtain those animals the bird is certain to give the alarm and cause the animal to disappear into the water.

I once procured a less than half-grown bird of this species, and if any one would like to have one it can be gotten up in the following manner: Take the hinder half of a black kitten, dip about four inches of its tail in red paint, then fasten to the legs a piece of tallow candle about four inches long, jab the wick end of the candle down hard on the floor to spread it out for feet. Stand it up and heave a boot-jack at it to give the desired animation, and a good representation of a young Black Oyster-catcher will be produced, for a more comical object than a toddling Oyster-catcher is difficult to conceive.

The one I had was put in the house until an opportunity offered to preserve its skin. It always greeted the opening or shutting of the door with its deafening noise. At night it became lonely and attempted to sing a song. I got up from bed to quiet it, and succeeded only as long as I remained out of bed. Neither the bird nor I slept that night. By early dawn it migrated to another building from which it escaped when I unguardedly left the door open.

The food of the Black Oyster-catcher consists entirely of whelks, limpets, and other similarly shaped shell-fish that adhere to the rocks. The crops of many of these birds were opened, and in only one instance did I find anything of a vegetable nature, and that was supposed to be pieces of sea-weed.

The feet are well adapted to a secure footing on the slimy rocks. The horny pectinations on the toes give additional security. It backs up a slippery, inclined rock when it wishes to change position; hence the necessity of only three toes.

This bird breeds on all the area mentioned. The eggs are laid on the bare rock, just above high-water wash. The number of eggs varies from one to three, usually two, and are laid about the 10th of June. The exact time of incubation is not known to me, but the young are able to walk about soon after hatching, and fly about the middle of August. The coloration of the young bird is the same as that of the adult, with the exception of the bill, which is lighter colored at the

anterior half and the basal half much lighter, even having a decided shade of yellow. The mouth is yellow. The flesh of this species is very nice when the skin has been removed.

The Russian name of the bird is *Morskoi Ptookh*, or Sea Cock. The Aleutian name is *Hekh* at Unalashka and *Hegis* at Atka. At Attu the bird is only known by reputation, and is there called *Hekh*, from its note.

It has never been observed outside of the limits defined above. Mr. H. W. Elliot does not place it in his list of birds from the Pribylof Group. I did not observe this bird at Kadiak Island, though Messrs. Dall and Bannister, in the List of the Birds of Alaska, with biographical notes, Transactions Chicago Academy of Sciences, 1869, record that it was obtained abundantly at Kadiak and Sitka.

The great distance between Kiska and Bouldyr Islands, together with inability to sustain protracted flight, may prevent this bird from attaining the westernmost islands of the Aleutian Chain.

298. DENDRAGAPUS CANADENSIS (Linn.). *Canada Grouse.*

The Canada Grouse occurs in the wooded districts of the Yukon Valley. It is common in some localities and rare in others. The lowest point on the Yukon River where it is found is at Mission.

The specimens obtained by me were from Nulato and Anvik, in March, 1876.

300*b*. BONASA UMBELLUS UMBELLOIDES (Dougl.). *Gray Ruffed Grouse.*

The Gray Ruffed Grouse is a resident of the wooded districts of the Yukon Valley. It is abundant at Nulato and Anvik.

The specimens which I obtained were from Nulato, March 15, 1875.

301. LAGOPUS LAGOPUS (Linn.). *Willow Ptarmigan.*

The Willow Ptarmigan is found in abundance on all the lower-ground regions of the entire mainland coast, including the Peninsula of Aliaska. It prefers the more level, open localities, and is rarely found near the edge of the wooded districts, it being there replaced by the Dusky Grouse, *D. obscurus fuliginosus;* the Spruce Partridge, *D. canadensis*, and the Gray Ruffed Grouse, *B. umbellus umbelloides*. Though during winter the Ptarmigan seeks shelter under the willow patches or other bushes on the creek banks and in the ravines, I have never observed this species on the Peninsula of Aliaska or on any of the Aleutian Islands. The physical character of those regions precludes the probability of it inhabiting them, it being there replaced by *L. rupestris*, and it alone. The Willow Grouse is always abundant where found.

In the last part of March, or by the 10th of April, the male begins to show few markings of rich brown on the neck. This is so constant a period that the Innuit have adopted it as the name of their fourth month, and call that month *Kup nákh chik*, or when the neck of the Ptarmigan is half brown.

The mating season begins by the middle of May. The male selects his mate by going through a series of fantastic antics, such as spreading his wings, his tail outspread and thrown over the back, the neck ruffled, and head either thrown back to meet the tail feathers or else stretched along the ground, while he utters a hoarse, barking croak and starts into the air with a bound, to sail and flutter round and round in a circle, and, alighting a few yards from her, to advance to her as though he wanted to run over her, but stopping when near to stretch up his neck and again go through the same performance. Woe to another male which thinks to coax away the object of his choice. The intruder has only to be seen by the other when a battle takes place. They seize each other by the feathers or comb. They pull and jerk until the one or other is exhausted. The intruder is nearly always vanquished, as the other would die before deserting his chosen female.

The natives have taken advantage of his pugnacious habits and capture great numbers of the males by preparing a stuffed male and fastening it firmly to a sharpened stick inserted into the body and securely tied to it. They then have a small net of three or four feet square, to which are fixed two pegs, one at each corner, to fasten it securely to the ground. The native sets out in search of a pair, and can hear them before long, as they are near some patch of snow on the open

ground. He approaches, fastens the net to the ground, and sticks the bird-decoy near the net. The live male soon perceives the decoy and rushes to it to give battle; he pulls and tugs at it until the native jerks a string which throws the net over him. I once saw a male Ptarmigan advance to the decoy while the native was yet setting the net, and not a foot from the decoy. In some instances the male is so courageous that he will advance when the decoy is held at arm's length. Even throwing the net over him does not cause him to desist fighting.

The nesting season begins about the 1st of June, or when the snow is generally gone from the low grounds and hillsides. The nest is usually on a hillside or under the shelter of a solitary straggling bush of small size. A few grass stalks or blades, with the few feathers that fall from the female's breast and abdomen, form the nest.

The number of eggs varies from nine to seventeen. The period of incubation was not determined. The young are able to follow the parents as soon as they are hatched. The young remain with the old. They are able to fly as soon as they are as large as Bob White, *C. virginianus*. By the middle of August they attain this size, and are the size of the adult female by the 1st of November. During the month of September the birds feed on berries, and their flesh is then better than at any other season.

When the snow has pretty well covered the ground in late November the Ptarmigans assemble in immense flocks, often numbering thousands. I was once out on the higher grounds just south of the Crooked Canal. I ascended a slight hill and came, unexpectedly, on one of these large flocks that covered acres of ground. I was among them before either was aware of it. They flew, and made both the air and earth tremble. There must have been over five thousand birds in this one flock. They flew beyond a neighboring hill-range. Approaching night and a heavy snow falling prevented me from following them.

During the winter these birds subsist on the past year's twigs of the willow and alder or other bushes. I have cut open the crops of many of these winter-killed birds and found them to contain only pieces of twigs about one-third of an inch long, or just about the width of the gape of the posterior, horny part of the bill, as though this has been the means of measurement in cutting them off. The flesh at this time is dry and of a peculiar taste. In the spring the Ptarmigans congregate in great numbers on the willow-bushes and eat the tender, swelling buds. The flesh then acquires a bitter, but not unpleasant taste.

As open weather advances they find berries that have remained frozen the entire winter, and tender grass shoots, and later, insects. The young are insectivorous to a great degree in their youngest days. They consume great numbers of spiders that are to be found on the warm hillsides.

The Ptarmigans that are reared on the Kavyáyak Peninsula migrate late in the fall to the interior. In the spring these birds go back to their summer haunts. The natives then arrange pieces of brush into small clumps set in a line and extending along the ice. On the branches of this brush they hang nooses of sinew. The place where the birds usually go back to the peninsula is near the end of Norton Bay, opposite Shaktolik and Egowik. The natives there prepare these thickets set with nooses during this season of migration. The birds come in such numbers to those places that when they see the bushes they follow them and many thousands are caught in the snares.

A single native, having only half a dozen clumps of these bushes, placed about seventy-five yards apart, cannot take the captured birds out fast enough. They say the birds seem to fall to the ice from every direction, they come in such great numbers. A man will, in a single day, catch a sledge-load of them. The natives bring them to Saint Michael's by the load; and sell them in that quantity for a mere trifle. They are used for dog-food at this season.

The Ptarmigan is by far the most abundant land bird of the Yukon district.

The question has been agitated whether the Ptarmingan moults the feathers from the summer plumage to the white of the winter plumage, or whether it is a fading of the colors of the summer plumage. The female during the incubating season is completely denuded on the abdomen and inner side of the upper thigh of feathers. In the winter this tract is completely feathered with white feathers. The abdomen at that season (when bare) is covered with a thick yellow, greasy, wrinkled skin, that is probably to protect her from the wounds she might sustain while on the nest,

and also to allow her to bring the warmth of her body directly in contact with the eggs. Birds killed just on the approach of the moult for winter always revealed pinfeathers having a white feather just starting out.

The Eskimo name of this Ptarmigan is *A kázh gik*, and refers to the sound produced by this bird when alarmed. Then the note is a *kaak*, when sounded deep in the throat.

302. LAGOPUS RUPESTRIS (Gmel.). *Rock Ptarmigan.*

The Rock Ptarmigan is found on all the hills and higher ground along the entire coast region of Alaska. In the interior it is found only on the mountain chains. It is abundant within the Arctic circle and down to Kadiak Island. To the westward it is found on the peninsula of Aliaska and all of the eastern islands of the Aleutian chain. It is the only species of Ptarmigan found on the eastern Aleutian Islands, unless the Willow Ptarmigan may be found on the island of Unimak, a few miles from the peninsula of Aliaska. On some of the islands it is extremely abundant; among those may be mentioned Unalashka, Unimak, Akutan, and Akoon.

It is resident where found; and, among the islands, rarely leaves its native island. At Akutan they are more abundant than elsewhere observed. They come even directly into the village, and may be seen or heard at any time on the hill-sides near by.

At Unalashka they seem to prefer the high, rocky ledges, but everywhere come down to the low, narrow valleys to roost and rear their young. They rarely assemble in large flocks; a dozen to twenty individuals usually comprise a flock.

The mating season begins in the early part of May, and is continued for about three weeks, by which time a site for the nest is chosen, usually amidst the tall grasses at the mouth of a wide valley, or else on the open *tundra* among the moss and scanty grass.

The male has assumed his summer plumage of rich chestnut, fulvous, and black markings on the neck, head, back, and edges of the wings, the rest of the body being white, which, by its contrast with the other colors, makes a magnificent plumage. The female has less chestnut, black, and white plumage, and more of the fulvous to render her less conspicuous. In the male the neck is stretched along the ground, the tail spread and thrown over the back, the wings outstretched, while he utters a rattling croak that may be heard for a long distance.

They seem to be less pugnacious than the Willow "Grouse" or Ptarmigan.

The nest of this bird is composed of a few stalks of grass and a few feathers that fall from the mother's breast. The nest is a very careless affair, and often near the completion of incubation the eggs will lie on the bare ground surrounded by a slight circle of grass stalks that have apparently been kicked aside by the mother impatient of her task. The number of eggs varies from nine to seventeen, eleven being the usual number. The exact date of incubation was not determined by me. The young are able to follow the mother as soon as they are hatched. As this bird never collects into large flocks, I always supposed the flocks seen in winter were the parents with the brood reared the previous summer. The power of flight of this bird is much stronger than its congener. It is sustained for a longer period and much more rapid. The flesh of this species is better than that of the Willow Ptarmigan and is much sought for as food. The best time to hunt this bird is early in the morning when the wind is calm and a moist snow is falling. The birds are then sluggish and dislike to rise to the hill-tops. At Saint Michael's this bird is more often seen in the winter, as during the summer it is on such parts of the mountains as are rarely visited by man. The physical character of the Aliaska Peninsula is eminently suitable to this bird, abounding in abrupt ridges of mountains and high, small plains, just such grounds as are not resorted to by the Willow Ptarmigan.

The seasonal changes of plumage take place in April to the middle of May for the summer, and in November for the winter plumage.

The Eskimo name of this bird is *Ŭng aú wik*, and refers to the guttural note produced on being surprised.

The winter plumage of this Ptarmigan is pure white with a black stripe at the base of the bill. In many of these birds the black stripe in the winter plumage is wanting.

The adult, male breeding-plumage of the specimen obtained from Unalashka, May 18, 1877, presents the following pattern of coloration:

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LAGOPUS RUPESTRIS ATKHENSIS (TURNER). ADULT MALE, SUMMER PLUMAGE.

LAGOPUS RUPESTRIS ATKHENSIS (TURNER). ADULT FEMALE, SUMMER PLUMAGE.

Ground color of back, scapulars, rump, and upper tail-coverts dark liver-brown, the nape and crown light reddish-brown barred with black; while the back and other posterior parts are very finely and densely vermiculated with black, producing the dark liver-brown aspect. Chin and throat white. The jugulum similar to the crown and nape, but with the black bars broader and more distinct, becoming finer and less distinct on the upper breast. The wing, including the primaries, secondaries, and some of the tertiaries, white with few scattered feathers of the same pattern of coloration as the upper back. The longer tail-coverts are somewhat darker than the color of the back, owing to the finer vermiculation of the black and the brown colors. The black stripe from base of side of bill much spotted with white. The lower breast, abdomen and under tail-coverts white. Tail black with a very narrow tip of white. The outline of the tail is decidedly rounded.

The adult female breeding plumage of a specimen * obtained at Unalashka May 18, 1877, presents the following pattern of coloration: Upper parts, including head, neck, and upper tail-coverts, bright brown ocher, the tips of each feather either brighter or else white; coarsely barred, having a tendency to spotting with black, which on elevating the superincumbent feathers is greater in area on each side of the shaft. The lower parts, including fore neck, breast, and sides, bright yellow ocher with sparser, but more regular, bars of black. The wings, including primaries and secondaries, white. The wing coverts similar to the coloration of the hind neck. The flanks and sides broadly barred with black and light yellowish ocher. The abdomen white. The lower tail-coverts very distinctly barred with black and yellowish ocher, the latter color finely dotted with black and narrowly tipped with white. The claws black, with light edges and tips. The tarsus and toes of both sexes covered with fine downy, white feathers, containing but few bristles.

The coloration of this bird is entirely distinct from that of the species occurring farther to the westward, and is somewhat darker than birds from the interior of the mainland.

302*c*. LAGOPUS RUPESTRIS ATKHENSIS (Turner). *Turner's Ptarmigan.* [See Plates III and IV.]

Catalogue number 85597, ♂ ad. Atkha Island, Alaska, May 29, 1879.

Ground color of upper parts light olive brown, altogether lighter than in corresponding plumage of *rupestris*. The whole surface very finely and densely vermiculated with black. The tips of many of the feathers lighter and more grayish, with very narrow crescentic bar of whitish. The ground color of head and nape above is more yellowish than on the back. The crown spotted with black. Ground color of fore neck, jugulum, and upper breast, light fulvous or yellowish-brown, distinctly and somewhat regularly barred with black. The upper breast, sides, and flanks similar, but more finely and distinctly barred with dusky. The wing, lower breast, abdomen, and under tail-coverts pure white. The inferior upper tail-coverts, in this example, are little lighter than the rump, simply the obliteration of the prevailing color of the back. Tail black and decidedly truncate, not rounded, as in *rupestris*, and narrowly tipped with white.

No. 85598. ♂. June 7, 1879. Atkha Island. This example of few days later plumage presents no appreciable difference from the one of May 29. The distribution of the white on the upper breast is little greater. The dusky shaft of the primaries is quite conspicuous in both examples.

Catalogue number, 85600 ♀ ad. Atkha Island, May 29, 1879.

Ground color of head, neck, breast, sides, flanks, and upper tail-coverts, light-brown ocher; paler and much less rusty than in the corresponding plumage of *rupestris*. The upper parts irregularly barred with black. The most of the feathers tipped with a narrow, crescentic bar of white, the black bar immediately preceding it is much broader than the others. The fore part of the back is irregularly spotted with black. Crown spotted with black, some feathers tipped with yellowish-white. Jugulum and breast more sparsely but regularly barred with black. The sides and abdomen similarly, but more broadly, barred with black and light yellowish-brown. But few white feathers occur on the breast and abdomen. The under tail-coverts very distinctly barred with black and light yellowish-brown. The wings white, the dusky color on the shafts not extending to the tips. The tips of the upper tail-coverts and tail have a narrow band of white.

* The bird occurring on Unalashka Island has since been described, by Dr. L. Stejneger, as a new sub-species, under the name *Lagopus rupestris nelsoni*. (See "Auk," I, 1884, p. 226.)

Example 85599 ♀ ad. June 7, 1879, from the same locality, is similar in pattern of coloration. Bill and iris black; claws black, with white edges and tips.

When I first obtained these birds I was struck with the greater size and also with the shape of the bill and greater length of the claws when compared with the mainland bird. This bird frequents the lowlands and hills of the western islands of the Aleutian Chain. They are quite plentiful on Atkha, Amchitka, and Attu Islands. The nest is built amongst the rank grasses at the bases of hills and the lowlands near the beach. The nest is carelessly arranged with few dried grass stalks and other trash that may be near. The eggs vary from eleven to seventeen, and are darker in color than those of *rupestris*, and but slightly inferior in size to those of *L. lagopus*. A number of eggs of this species were procured, but broken in transportation; hence, can give no measurements of them. The general habits of this species are those of the other species. At Attu they frequent the higher elevations, probably on account of the great number of foxes (*Vulpes lagopus*, Baird), which occur on that island, and have but little to subsist on. The natives of Attu assert that this same species of Ptarmigan occurs on Agattu Island, and that it is quite numerous there, probably on account of the absence of foxes.*

The following tables show the comparative measurements of eight males and seven females of *rupestris*, taken from various localities in the central part of the Hudson Bay Territory and from Alaska:

	Gape.	Nostril to tip of maxilla.	Culmen.	Gonys.	Height of maxilla at nostril.	Tail feathers.	Tarsus.	Middle toe.	Middle toe claw.	Wing.	
Average ♂	.77	.38	.76	.32	.19	4.10	1.21	.97	.62	7.50	Eight examples.
Average ♀	.80	.37	.71	.30	.18	3.90	1.10	.94	.55	7.10	Seven examples.

Measurements of two males and two females of atkhensis from Atkha Island.

Average ♂	.91	.44	.87	.36	.24	4.25	1.34	1.06	.65	7.82	Two examples.
Average ♀	.89	.44	.83	.36	.24	4.00	1.28	1.10	.57	7.69	Two examples.

331. CIRCUS HUDSONIUS (Linn.). *Marsh Hawk.*

The Marsh Hawk appears to be a resident of the Yukon district only between the early part of April and late November. Many specimens were obtained from the interior and none during the winter months. A single specimen was killed at Saint Michael's, where it is rare. It frequents the lowlands and rolling ground, and especially the neighborhood of extensive marshes bounded by low hills, where its food of ducks and large snipe abound. I did not obtain nest or eggs, though it breeds in the interior. At Fort Yukon it appears to be abundant, as many specimens were obtained from that locality in May of 1875 and 1876.

A flock of ten individuals of this Hawk were seen near the graveyard near Iliuliuk Village on Unalashka Island. The birds wheeled round and around my head, and at times darting after my cap, which I threw into the air. I never observed it before or after that date, October 16, 1878.

This species is a rare summer visitor to Attu Island.

332. ACCIPITER VELOX (Wils.). *Sharp-shinned Hawk.*

Several individuals of the Sharp-shinned Hawk were seen in the vicinity of Saint Michael's. I could not obtain a specimen. The natives of the lower Yukon River use the skins of this species in several of their ceremonies performed over the sick.

This species does not visit the Aleutian Islands.

* The Rock Ptarmigan occurring on the Nearer Group of the Aleutian Islands may prove to be distinct from the one procured from Atkha, as the isolated condition of the group will fully warrant the assumption. I saw the Attu Ptarmigans only in winter, a period of the year not to be taken as a time for making comparisons of birds so nearly alike at that season.

334. ACCIPITER ATRICAPILLUS (Wils.). *American Goshawk.*

The American Goshawk is a common species throughout the Yukon Valley, and apparently confines itself entirely to the mainland, although plentiful along the seashore. Specimens were obtained from Fort Yukon, Yukon Delta, and the vicinity of Saint Michael's. The tracts preferred by this Goshawk are the narrow valleys, borders of streams, and the open tundra, which it constantly scans for Ptarmigan and small mammals; the Lemming forming a considerable portion of its food. It will sit for hours in some secluded spot, awaiting a Ptarmigan to raise its wings. No sooner does its prey rise a few feet from the earth than with a few rapid strokes of the wing, and a short sail, the Goshawk is brought within seizing distance; it pounces upon the bird, grasping it with both feet under the wings; and after giving it a few blows on the head they both fall to the ground; often tumbling several feet before they stop; the Hawk not relinquishing its hold during the time. During the mating season of the Ptarmigans many males suffer death while striving to gain the affection of the female, for as he launches high in air, rattling his hoarse note of defiance to any other male of its kind in the vicinity, the Goshawk darts from a patch of alders or willows, or from the edge of the neighboring bluff, and with a dash they come to the ground, often within few yards of the terror-stricken female, which now seeks safety in flight as distant as her wings will carry her. I have seen this hawk sail without a quiver of its pinions, until within seizing distance of its quarry, and suddenly throw its wings back, when with a clash they came together, and the vicinity was filled with white feathers, floating peacefully through the air. I secured both birds, and found the entire side of the Ptarmigan ripped open.

On another occasion I shot a fine individual as it rose from a small clump of willow, to which I had approached unobserved by the bird. It had been devouring a Ptarmigan, which it had secured but a little while before. The flesh of the bird was yet warm, though nearly all devoured. The Goshawk was only wing-tipped with shot and proved to be quite vicious, seizing my boot with its talons and striving to grasp my hand with its beak. The bird was so quick that I had to call the assistance of a native to detach the claws from my clothing. Upon skinning the bird I found its crop to be full of the flesh of the bird it was eating when I flushed it. I am under the impression that the Goshawk is not able to fly with the weight of a Ptarmigan in its claws. It is a resident of the interior and comes to the coast quite early in spring, as is attested by the fact that I killed one specimen April 28, and a fine example was brought to me from the mouth of the Uphún (part of the northern Yukon Delta), where it was killed April 25. It was a female, and contained an egg quite ready for extrusion, and had already received a pale bluish-green color on the shell. The bird was shot while on the nest, placed in a small poplar tree. The nest was composed of sticks and a few blades of grass. The size was quite bulky, measuring nearly two feet in extreme diameter, and having but a slight depression. The bird was extremely vicious, choosing to remain on the nest rather than desert it. The male attacked the native and tore his cotton shirt into shreds and snatched the cap from the head of the astonished man, who was so surprised, at the impetuosity of the attack, that he struck wildly at the bird with his arms, and before he could reload his gun the bird took flight. This Goshawk breeds wherever found in summer, placing its nest in a tree or shrub, or even on the ledge of a cliff, inaccessible to foxes or other enemies.

The Innuit prize the tail and wing feathers of the Goshawk very highly for tipping the shafts of their arrows and darts. The relative value of one of these birds is that of two skins of the adult reindeer. They give the name *Ŭv ing u lĭkh tûk* to this species, in allusion to the bars on the tail-feathers. The iris of this species is yellowish, the feet nearly the same color, lighter and brighter in spring and summer and darker in winter. The cere in fresh specimens is pale greenish, becoming yellow on drying. The beak is pale bluish, to dusky or clouded, and always having a black tip. Claws always black. The eyelids yellowish or yellowish-green. This species apparently prefer tracts of country the opposite to that chosen by its near relative, *A. atricapillus striatulus*, of the lower portion of the Alaskan territory; the latter preferring the more heavily wooded portions. I was led to conclude that the American Goshawk is not apt to wander over great areas of country, but that after it has chosen a locality, which will afford a supply of food, it remains in that immediate vicinity, changing its location only in winter upon stress of weather.

347*a*. ARCHIBUTEO LAGOPUS SANCTI-JOHANNIS (Gmel.). *American Rough-legged Hawk.*

This Hawk is not abundant in the Yukon District. A specimen was obtained from Saint Michael's and one from Fort Yukon. At the latter place it is more common than on the coast.

I know nothing of its general habits, as I failed to obtain either eggs or nest.

An individual of this species was seen in captivity at Iliúliuk village, on Unalashka Island. I had just returned to the place from a sea-voyage in July, 1878. The Hawk was a sorry looking object, having been shot through the wing. It eagerly devoured pieces of raw fish that were thrown to it. A Bald Eagle, also in captivity at the time, was its companion. The two birds got along well together. The Hawk was quite passive and rarely attempted to show a vicious disposition.

349. AQUILA CHRYSAËTOS (Linn.). *Golden Eagle.*

The Golden Eagle is not rare in the neighborhood of Saint Michael's. It is more frequently seen further north in the vicinity of Norton Bay, and in the hills back of Pastolik, than on Saint Michael's Island. The single specimen obtained by me was brought from a few miles back of Pikmiktálik, where the bird had been caught in a steel trap set for foxes. The bird was caught by the feet as it attempted to carry away the bait fastened to the trap. The date of its capture was March 10, 1877, indicating a winter residence in that locality for this bird. That month was the coldest March during the four years at the village of Saint Michael's, but few miles north of Pikmiktálik. The bird was doubtless impelled by keenest hunger, as it was observed for several days to attempt to take bait from other traps when this one was set, and succeeded in taking the Eagle. The range of this bird is irregular. It is found in some localities with the Bald Eagle, and again where the latter is not to be seen.

On the Aleutian Islands it is quite a common bird. At Unalashka they are fully as common as the Bald Eagle, and are reported to breed in March in the high bluffs on Makúshin Point.

On the western end of Unalashka Island I saw several of these birds flying along the cliffs.

At Atkha Island they are quite numerous, being more plentiful than the Bald Eagle. They are reported to breed on the cliffs and crags of Korovinsky Volcano. At Atkha the Golden Eagle is not at all shy while flying, seemingly more intent on satisfying a curiosity as they pass overhead. I saw a single specimen on Amchitka Island, in May, 1881, and none further west of that place. They do not at all occur at Attu, as a year's stay at that place afforded me the sight of but one eagle while there. The Golden Eagle has but one note, of a prolonged, shrill whistle, uttered either on the wing or at rest.

Their food consists of ptarmigans, ducks, and other birds, while I have seen them under such circumstances that I believed they were eating from a dead fish, which had long before been thrown on the beach.

The Eskimo of Norton Sound call this bird *Ma tŭg vĭk*, a word I could not obtain any meaning for.

352. HALIÆETUS LEUCOCEPHALUS (Linn.). *Bald Eagle.*

The Bald Eagle is occasionally seen in the vicinity of Saint Michael's, and is reported to be not uncommon in the interior. I saw several specimens along the coast of Bristol Bay in 1878.

Among the Aleutian Islands it is plentiful. At Unalashka Island it breeds among the cliffs on the northern side of the island. They breed early in March. The young are frequently brought to the village of Iliúliuk, where they are kept for several weeks, or until some one maliciously kills them. Several adults were also seen there in captivity. They had been wounded and brought to the village. This eagle has the habit of sitting on the edge of some high bluff for hours at a time. They are at this place quite difficult to approach. At Atkha Island they are very numerons, coming directly into the village to remain for several hours at a time. At this time is not at all shy. They will allow approach to within few yards, so close that I have thrown a stone to make them fly so that I could shoot them while on the wing. They breed on several of the high bluffs of the northeast shoulder of the island. Near the anchorage in Nazan Bay, of Atkha Island, are two large, sugar-loaf shaped rocks that rise perpendicularly from a rocky base, which is exposed only at lowest tides. On the top of these peaks, of near 250 feet high, the Bald Eagle has reared its

young for many years. This eagle is found as far westward as Attu, but does not breed there, according to the natives. I saw one at a great height in October, 1880, and bringing a glass to bear on it I could easily recognize it to be the Bald Eagle. This was the only instance of its occurrence from July, 1880, to June, 1881. The white head and tail, with a different mode of flight, enable one to distinguish it at a great distance.

At Amchitka Island I saw several pairs of this bird in June, 1881.

I was always on the lookout for *H. albicilla*, but have come to the conclusion that it does not occur on the Aleutian Islands.

Repeated inquiry among the traders, who had been long in the country, revealed to me that when they had seen such birds as I most desired to learn the occurrence of, I found, on longer acquaintance with them, that traders generally described an eagle that turned out to be a Cormorant or Loon.

The adult Bald Eagle is a fine looking bird and always in clean plumage. When in captivity he is the most bedraggled object, with scarcely a clean feather on him.

The food of this eagle is rather mixed, consisting of ptarmigans, ducks, and an occasional fish. Any fish or bird that may be thrown dead on the beach is eagerly eaten by this eagle. I saw in Nazan Bay, on Atkha Island, a pair of these eagles wrangling with dozens of gulls and several ravens over the putrid carcass of a sea-lion.

This bird is undoubtedly the origin of the "*bayglei*" of the Eastern Aleuts, as it sometimes sits on a hill top or open space and opens its wings to air them, or sits in such a strange position that it is, at a distance, scarcely recognizable as a bird. The timid Aleut imagines it to be some strange beast, which entices the victim within reach and disappears with it; and, according to their story, this beast turns out to be a man, who keeps the captive as his servant.*

I once had occasion to ascend the top of a high hill near Iliúliuk village. When I was up about 500 feet high I saw something, off at what I thought to be but a comparatively short distance, and supposed it to be a native hunting Rock Ptarmigan, *L. rupestris nelsoni* Stejn. I hallooed for the person to wait for me. I then passed round to another side of a spur and found the object had disappeared, but soon saw it return, and found it to be a Bald Eagle, which looked as large as a man; for the difference in density of the atmosphere had magnified it, as I was much lower, that when I arrived at the top of the mountain I saw what a great distance I had estimated as being only a couple of hundred yards. When I first saw the bird I did not know that a terrible gale was waiting my arrival at the top of the mountain.

353. FALCO ISLANDUS Brünn. *White Gyrfalcon.*

A single specimen of this Gyrfalcon was killed at Saint Michael's May 15, 1877. It is not a common bird in this vicinity, and oftener seen in spring than at other seasons.

I could learn nothing about its habits.

354*a*. FALCO RUSTICOLUS GYRFALCO (Linn.). *Gyrfalcon.*

Several specimens of this Gyrfalcon were obtained in the vicinity of Saint Michael's, where it is a constant resident, with probable exception during protracted periods of severe weather in winter only.

The natives assert that this bird breeds on the high hills, either on a rocky ledge or on the moss-covered ground.

I did not obtain eggs and nest of it. It is very active on the wing. Its food consists principally of Ptarmigans, which it seizes only when the prey is on the wing. I saw one capture an adult male Ptarmigan in April, 1876. The Gyrfalcon struck the bird with its breast; and, as the

* The *bayglie* stories of the Aleuts are a wonderful mixture of cunning and superstition. I think, however, the earliest Russians made use of the expression (for in the Russian language the word means deserter, runaway) in all its subsequent meanings, in order to deter their women, whom they had, in most instances, forced from their homes and compelled to live with their hated mates, from deserting them and returning to their own people. At the present day it is used as a "bugbear" to prevent the small children from wandering away. Many of the adults stoutly maintain that they have seen these apparitions. The Attu people do not use the expression only as they have heard of it from their eastern relations.

Ptarmigan recoiled from the blow, the hawk seized it with its claws and bore it to the ground, where it soon dispatched it.

In the fresh specimen the color of the iris is yellow; bill white with dark tip; tarsi and toes bluish-white; claws black; cere greenish.

The natives use the wing and tail feathers of this bird as vanes for the shafts of their spears and arrows.

The Eskimo name of this Gyrfalcon is *Ché kŭ'v yŭk*, and refers to the longitudinal stripings on the breast.

356. FALCO PEREGRINUS ANATUM (Bonap.). *Duck Hawk.*

I saw but two or three individuals of this species at Saint Michael's; the character of the country not appearing favorable for its occurrence. They were observed at such irregular intervals that I concluded the Duck Hawk was merely a casual visitor to that part of the coast. In the interior, and especially along the high bluffs overhanging the Yukon River, it is reported to be not rare.

In the vicinity of Bristol Bay I saw two pairs launch from the cliffs near Cape Newenham, and also one bird fly past the vessel as she was anchored in the Nushagak River, opposite the trading post on that stream. This date was June 25, 1878.

There can be no question that the Duck Hawk breeds in the more suitable localities of the entire range over which it wanders. I did not obtain eggs or nests of this species. Its general habits are quite well known.

356*a*. FALCO PEREGRINUS PEALEI Ridgw. *Peale's Falcon.*

This Falcon was frequently observed on Amchitka Island in the month of June, 1881; and on several occasions on Attu Island, during 1880 and 1881. It breeds on nearly all of the islands of the chain, and is a winter resident, on the Nearer Group at least. On Agattu it is reported to be very common; and, on Amchitka I knew of three nests on the ledges of the high bluffs, hanging over the sea. Any approach to the cliffs was heralded by the bird darting from the nest and circling high in the air, screaming fiercely all the while. Any attempt to shoot the birds, while flying over the water, would have resulted in the loss of the specimen, for they always flew in front of the cliffs out of gun-range.

At Attu Island I frequently saw one of these birds join the Ravens when the latter were performing their aërial gymnastics on the approach of a gale.

The Hawk endeavored to imitate the Ravens, which paid but little attention to the antics of the intruder.

At Attu this hawk is not common, though the natives assert that it is common enough at Agattu and the Semichi Islands. The natives had told me that where this Hawk breeds there will be found the nests of Eiders. I could not believe it until a short stay at Amchitka Island forced me to recognize it as a fact, for, in each instance, the nests of Eiders were very abundant in each of the localities where the nest of this hawk was known to be. It is quite probable that the hawk selects the place with special reference to prospective young Eiders.

The Eskimo use the skins of the smaller hawks in several of their dances, and in many of the incantations held over those afflicted with disease. The skin is affixed to a large mask, worn over the face. The skin of *Accipiter velox* is also used for the same purpose.

357. FALCO COLUMBARIUS (Linn.). *Pigeon Hawk.*

This species of Hawk was observed on several occasions in the vicinity of Saint Michael's, though never at such times as led me to believe that it breeds there. Its visits were merely wanderings at times when not caring to devote itself to the duties of rearing its young.

Unfortunately their appearance was at such times that I could not procure a specimen from the mainland.

An individual was procured at Unalashka in the year 1879, and was the farthest west that I observed the Pigeon Hawk.

In the early part of August, 1881, I saw two, evidently mates, at the northwest end of Kadiak Island.

364. PANDION HALIAËTUS CAROLINENSIS (Gmel.). *American Osprey.*

A single specimen of the American Osprey was obtained from Fort Yukon, May 20, 1876. It is reported as an early arrival; and during the summer to be not uncommon, though it ranges along the smaller tributaries rather than the larger rivers.

I have been assured, by natives and white persons, that the Osprey does not descend the Yukon River lower than the Mission. At Nulato it is quite common on the north side of the river, and rarer on the south side.

They return for many years to the same nest.

I did not obtain either eggs or nest of this species.

Some of the native tribes greatly prize the wing and tail feathers to affix to their arrow shafts.

367. ASIO ACCIPITRINUS (Pall.). *Short-eared Owl.*

The Short-eared Owl is the commonest bird of prey in the Territory. It is to be found in all localities of the mainland and Aleutian Islands. It is most abundant on the lowlands, where it may be seen on the wing nearly every day in the year. It is a common sight in the spring, during the arrivals of the smaller kinds of water birds, to see this owl sailing or flopping over the marshes in search of food. During the brightest days it generally remains in an alder thicket, but flies at the least alarm. They are more often shot as it flies unwittingly by.

I had occasion to go out to the end of my house one night with a lighted cigarette in my mouth. Suddenly something came so close to my head as to nearly knock my cap off. In a moment another came. I saw it to be an owl and ran for my gun. As I suspected the light from my cigarette had attracted the bird I tried some matches. In a moment owls were thick around me. I succeeded in killing nine of them, and knew that several more were lying not far off, but could not find them, as I could only see objects which were several degrees above the horizon.

I could not obtain eggs of this species, although it is reported to breed anywhere among the grass and moss of the hillsides. Among the Aleutian Islands this owl is not rare. I obtained a specimen at Unalashka Island, where the natives assert it is to be found in the larger ravines.

At Atkha Island I saw one of them as it flew from a patch of wild rye. It was the only one seen. At Attu I saw one, but missed killing it, as it was too far off for large shot. The Aleuts have no good word for this bird. The women are afraid to touch it.

Among the natives of the Yukon District the liver of this bird is used as a love-philter. The liver is dried and reduced to a powder; and placed, unknown, to the person to whom the philter is to be administered, in some food. On eating the food the desired affection is supposed to make itself evident. I knew of an instance where a native endeavored, by this means, to regain the affection of his wife. The mother-in-law had more potency than dried owl-liver; and as she controlled her daughter the philter was as naught.

It is administered, indifferently, by man or woman, and is frequently used by the Eskimo.

The native (Eskimo) name of this owl is *Mŭng ku chĕ wŭk.*

370. ULULA CINEREA (Gmel.). *Great Gray Owl.*

The Great Gray Owl is a resident of the Yukon Valley and was obtained on the coast at the Uphún Slough, the northern part of the Yukon Delta. It is not common there. The specimen was a female containing large, but undeveloped, eggs, two in number; hence should conclude the period of incubation to be from the latter part of April to middle of May, as this specimen was obtained April 8, 1876. The iris was yellow, bill white, cere pale flesh-color, and dark claws.

Several specimens were obtained from Fort Yukon, where this bird appears to be common and resident.

It is said to be very stupid during the day but active during the twilight.

Their habits were not learned.

The colors of this species are dusky grayish-brown and grayish-white; the former color prevailing above and the latter below; the upper surface with mottlings of a transverse tendency; the lower surface with the markings in the form of longitudinal stripes, which are transformed into transverse bars on the flanks, &c. Face grayish-white, with concentric rings of dusky. The tail

ULULA CINEREA LAPPONICA (Retz.) Adult Female, one-third Natural Size.

The throat is white with irregular patches of blackish, having few spots of fulvous on each feather not purely white.

No. 70276, from Saint Michael's, has the bars finer and extending nearly across the under surface of the body, with exception of throat, upper breast, and legs. The throat nearly pure white. The jugular and upper breast with fewer blotches of blackish. The tail and its under coverts finely barred with more decided brownish. Legs nearly uniform whitish-fulvous, with few irregular markings of lighter brown than on abdomen and showing but little barring. Entire upper surface and wings slaty brown, with very fine markings of white and fulvous, the latter in excess on elevating the tips of the feathers, though nearly concealed when the feathers are arranged in order.

No. 70277, ♀, Saint Michael's. This example is strikingly different from all the others. The ground color is grayish-fulvous above; tail and wing coverts are the darker portions of the upper surfaces. The back, shoulders, head, and rump show narrow lines transversely, with little disposition to form bars, the markings being very irregularly disposed. The tail above shows a slight evidence of barring, and becomes nearly obsolete below, where the inferior surface of the feathers show the bars only on the inner web and only obsoletely on the extreme half of the outer web. The breast, neck, abdomen, and legs are nearly pure whitish; bars of very fine lines are transversely disposed on the sides and flanks. This example is a young male, in nearly adult plumage, obtained in March, 1877, having been a bird of the previous year.

There are no appreciable differences in the measurements of any birds of this species obtained from those localities. The bill is blue-black; cere dark greenish; claws black, with lighter tips; iris yellow, with fine, brownish specks, especially nearer the pupil.

376. NYCTEA NYCTEA (Linn.). *Snowy Owl.*

The Snowy Owl is a resident of all the northern part of Alaska, both interior and insular. The first specimens seen by me were on a high piece of floating ice, far out at sea between Saint Mathew's Island and Saint Lawrence Island, in Bering Sea. Several rifle shots were fired at them, which had only the effect to make the birds walk to another place on the ice. At Saint Michael's this owl was frequently brought to me. I have seen them on the hill just back of the Redoubt and on the hills beyond the "Canal." A few miles in the interior it is quite plentiful at all seasons of the year. It flies quite as well during cloudy days as at night but is at all times rather shy. They are more often obtained when they are startled from some bunch of grass or straggling willow patch. I know nothing of their breeding habits, but the natives assert that it breeds under the overlapping grass on the edge of a low bluff; that it lays four white eggs early in April.

This Owl is not rare on some of the Aleutian Islands. A fine specimen was shot by Mr. Robert King, the agent of the Western Fur and Trading Company, at Iliúliuk village, Unalashka Island. The Owl had been observed for several nights on some of the buildings near the stable, doubtless watching a convenient opportunity to pounce on a pair of tame rabbits that lived under the stable. The bird was sitting on the flag-staff but a few yards in front of the dwelling of Mr. King, who immediately presented the bird to me.

This is the only instance where I obtained a specimen from Unalashka Island. The natives assert that it is only occasionally seen there. At Agattu Island it is quite common. It rarely visits Attu, but few miles from it. Its rarity is, doubtless, due to the presence of foxes (*V. lagopus*) on the latter island.

On Agattu Island this Owl is a constant resident.

The food of this bird is composed of grouse, ducks, and an occasional stranded fish. The iris is yellow; bill and claws white.

The Eskimo name of this Owl is *Ung pük*, or Great Beard.

[377.] SURNIA ULULA (Linn.). *Hawk Owl.* [See Plate VI.]

Above light brownish gray, darker on upper back; sides of lower neck, wings, and tail much spotted with irregular, quadrate blotches of grayish-white, having a slight tendency to produce undulating bars on the middle back; the brown color predominating on the tail, wings, and lower neck. Head and nape whitish-gray, with fine bars of light brownish-gray on the occiput, becoming less in amount at the lower, posterior margin of the crown. Crown grayish, with numerous, irregular,

transverse, narrow bars of brownish-slate, these dark markings becoming more numerous on the forehead. The ear-coverts of slaty-brown, forming a conspicuous, perpendicular, bar which is produced over the disk of each eye. A postcervical band of light brownish-gray is scarcely interrupted in its conjunction with the perpendicular bar behind the ear-coverts. Sides of wing-coverts nearly pure white, with few markings of the same color as the middle back.

Facial disks grayish-white; the bristles on the sides of the base of beak blackish.

Lower surface grayish-white with numerous narrow bars of grayish, brown; the latter bars occupy about one-half the width of the grayish space on the breast and sides, and become about one-fourth as wide on the abdomen and with a corresponding increase in the width of the grayish; or, in other words, the grayish is about four times as wide as the brownish. Inferior surface of the tail rather lighter than the superior and have the grayish bars less apparent, owing to the two colors blending together. The superior surface of the tail is marked with eight, narrow, transverse bars of grayish, the latter terminal, while counted from below there are nine bars. A broad, pectoral band of grayish extends from the carpal joint, of the closed wing, to the opposite side, and is nearly an inch in width, devoid of other than few, subquadrate markings of light brownish-gray. Above this band there is a blackish spot, of irregular outline, formed on the upper sides of the breast. The under surface of the wing is not different from the superior surface, excepting that the spotting is nearly pure white and of larger size than that which shows on the outer webs of the superior surface of the wing-quills.

In life the bill is ivory-white; iris yellow; claws dusky.

This bird measures slightly larger than the American Hawk Owl. The wing, 9.75 inches; tail, 7.10 inches; culmen, .85 inch; tarsus, .86 inch; middle toe, .82.

The European Hawk Owl is but rarely seen in the vicinity of Saint Michael's.

The first bird of the kind that I saw was brought to me by a native, who obtained it in the bushes near the southeast base of Shamán Mountain, near the Redoubt. An Eskimo dog stole the bird and destroyed it before I could get it away. The second specimen was procured by me. I was ascending a gravelly point of land on the northeast end of the island, when a native who was with me called my attention to the bird, sitting in a clump of rank grass. I had no gun with me; the native assured me that the bird was not vicious. I seized the bird with my hands; and, while examining it, the soil and grass beneath me gave way, and while attempting to prevent myself from sliding down hill the bird got away from me and flew off. The third example was brought to me by a native. The skin was preserved, but has been lost in some unaccountable manner.

The two species are distinguishable at a glance, by the dark markings, prevailing as spots, on the American bird, and the light markings predominating on the European bird.

The natives assert that it is a resident and breeds in the vicinity of Saint Michael's; also that it is a coast bird, *i. e.*, not going far into the interior; and that it can live a long time in winter without food, as it remains for days in the protection of the holes about the tangled roots of the willow and alder patches. The native (Eskimo) name of this species is *I ŭńg nŭk*, and signifies pallid.

377*a*. SURNIA ULULA CAPAROCH (Müll.). *American Hawk Owl.*

Description.—Above dark vandyke-brown, darker anteriorly, less intense, and more grayish, on the tail; a narrow streak of brownish-black originates over the eye, and extends backward above the upper edge of the ear-coverts, where it forms an elbow, passing downward, in a broad stripe, over the ends of the ear-coverts. Confluent with this, at about the middle of the vertical stripe, is another of similar tint, which passes more broadly down the side of the nape. Between the last stripes (those of opposite sides) is another, or medial one, of less pure black, extending from the occiput down the nape; every feather of the crown, forehead, and occiput with a central, ovate dot of white—those anterior more circular, those on the occipit less numerous and more linear. Between the lateral and posterior nuchal stripes the white prevails, the brown forming irregular, terminal and transverse or medial spots. These become more lineal toward the back. Interscapulars plain; posterior scapulars variegated, with partially concealed, large, transverse, spots of white; the lower feathers with nearly the whole, outer webs white, their confluence causing a conspicuous patch above the wing. Rump with sparse, irregular, but generally transverse spots of white; up-

per tail-coverts with broader, more regular bars of the same, these about equal to the brown in width. Lower feathers of the middle and secondary wing-coverts each with an ovoid, white spot on the outer web; secondaries crossed by about three series of longitudinally-ovoid, white spots (situated on the edge of the feathers), and very narrowly tipped with the same; primary coverts with one or two less continuous, transverse series of spots, these found only on the outer feathers; primaries with about seven transverse series of white spots, these obsolete, except on the five outer feathers, on which those anterior to the emargination are most conspicuous. All the primaries are very narrowly bordered with white at the ends. Tail, with seven or eight very narrow bands of white, those on the middle feathers purely so, becoming obsolete exteriorly; the last is terminal. Eyebrows, lores, and face grayish-white, the grayish appearance apparently caused by the blackish shaft of the feathers; that of the face continues (contracting considerably) across the lower parts of the throat, separating a large space of dark brown, which covers the whole throat from an indistinct collar of the same, extending across the jugulum, this collar uniting the lower ends of the auricular and cervical, dusky bands, the space between which is nearly clear white. Ground color of the lower parts white, but everywhere with numerous, very regular, transverse bars of deep brown of a tint more reddish than the back, the brown bars rather more than half as wide as the white ones; across the upper parts of the breast (beneath the gular collar) the white very much invades and reduces the brown, forming a broad, lighter belt across the jugulum; below this the brown bars increase in width, their aggregation tending somewhat to a suffusion, giving the white jugular belt better definition. On the legs and toes the bars are narrower, more distant, and less regular. The whole lining of the wings is barred like the sides. The dark brown prevails on the under surface of the primaries, &c.; the former having transverse, irregular, elliptical spots of white, those touching neither the shaft nor the edge; on the longest quill are seven of these spots; on all they are anterior to the emargination.

There is considerable individual variation of plumage in this species. The darker colors may be of a more or less reddish-brown and have the same general distribution of coloration as described above, or else the lighter colors may be greater in amount with the same general pattern. The beak is generally palest flesh-color in life, or even ivory-white, but becomes yellowish on drying. The claws are dark to pale horn-color. The wing is 9 inches long; tail, 6.5 to 7 inches; tarsus, .9 inch; middle toe (without claw), .80 to .83 inch. There are no exterior differences in the sexes of this bird.

The American Hawk Owl is a very common resident throughout the Yukon district. Along the coast it is quite abundant. They usually seclude themselves in the willow or alder patches, or are frequently startled from some grass-covered bank of a lake. They fly equally well by night or by day. I once observed a bird of this species sitting, during a bright day, on a post. I approached the bird to within a few feet. It squatted, then stood up, and seemed ready to fly at any moment. I went within six feet of it, and it then settled down as if to take a nap. I retired and threw a stick at it to make it fly. I shouted and made other noises, and only after several attempts to dislodge it did it fly. When taking flight from an elevated position they invariably drop to within a few feet of the earth and sail away rapidly. They are not at all vicious; they hold tightly with their claws, and in no instance did a wounded Hawk Owl attempt to use its beak, though the feathers on the head and neck were raised and an attitude of threatened attack with beak was always made. After a few minute's captivity they become passive and make no attempt to escape. In the neighborhood of Nulato, Anvik, and Fort Yukon this owl is quite abundant. It is probable that this species rarely wanders far from where it was reared, though excessive periods of cold may cause it to retire to the ravines and bush-patches of the interior. The natives assert that these birds can live several days without food, which consists of small birds and mice; the heads of its victims being the preferred parts.

The nesting habits were not learned by me.

The Eskimo call this bird *Tŭk fē á ling ŭk*, and refers to the spots on the plumage resembling something else.

390. CERYLE ALCYON (Linn.). *Belted Kingfisher.*

A single specimen of this bird was obtained at Fort Yukon. It is said to be common along the entire Yukon River and is a summer visitant only.

394. DRYOBATES PUBESCENS. *Downy Woodpecker.*

The Downy Woodpecker ranges throughout the wooded districts of Alaska.

Along the Yukon River it is very common. It prefers the poplar groves and alder thickets. At the Yukon Delta it is common in winter, seeking its food among the willow patches.

It occasionally visits the vicinity of Saint Michael's, as one was seen at a distance as it took flight from a thicket of willows on the edge of a lake, west of the Redoubt.

401*a*. PICOIDES AMERICANUS ALASCENSIS (Nels.). *Alaskan Three-toed Woodpecker.*

Specimens of the American Three-toed Woodpecker were obtained from Nulato and Fort Yukon, on the Yukon River. The bird is a resident of the wooded districts, and common in some localities.

The iris is black; tip of bill black, becoming paler posteriorly to nearly white at base; toes and feet black.

The difference in plumage of *alascensis* and *dorsalis* is sufficient to warrant the separation of the two forms, but from a lack of sufficient material for comparison the matter may be considered as not yet decided.

401*b*. PICOIDES AMERICANUS DORSALIS Baird. *Alpine Three-toed Woodpecker.*

This Woodpecker is abundant in the interior wherever there are wooded districts.

It rarely visits the vicinity of Saint Michael's. A single specimen was seen in April, 1876, on the high staff at the end of the warehouse. It flew off immediately. I again saw an individual of this species among some poplar trees, about eighteen miles southeast of the Redoubt, in March, 1877.

At Fort Yukon this bird is numerous. From there I obtained all my specimens.

I could not learn of the occurrence of this bird on the western part of Aliaska. At Nushagak Station, and on the river of that name, it is quite abundant.

412. COLAPTES AURATUS (Linn.). *Flicker.*

The Flicker does not occur on the coast of the Yukon District to my knowledge. A specimen was obtained from Fort Yukon, where it is not abundant.

457. SAYORNIS SAYA (Bonap.). *Say's Phœbe.*

Several specimens of this bird were obtained from Fort Yukon, where it arrives during the latter part of May. I am not aware that it descends to the coast.

474. OTOCORIS ALPESTRIS LEUCOLÆMA (Coues). *Pallid Horned Lark.*

A single specimen of this bird was brought to me by a native, who said he had just killed it at Egg Island, a few miles from the village of Saint Michael's. It was a female and had been just killed. This species is not common in that vicinity, but is said to be common on the higher hills just back of the seashore. The bill, feet, and iris were black.

475. PICA PICA HUDSONICA (Sab.). *American Magpie.*

A specimen of this Magpie was not obtained by me. Several of the traders from the Upper Yukon district reported this species to be not rare in the neighborhood of Fort Yukon, and rather more common in the vicinity of Fort Reliance, farther up the Yukon River but south of Fort Yukon. I saw a single individual at Unga Island in the latter part of July, 1881. It is said to breed on the island among the alder thickets. At Kadiak Island I observed quite a number of these birds. A young bird was seen as a captive at Karluk fishing-station, on the northwest shoulder of Kadiak Island. The bird was quite gentle, constantly uttering its harsh cry. At Saint Paul's village, Kadiak Island, I observed quite a number of these birds among the shade trees within the village. They were constantly quarreling; even the dashing rain, which prevailed during my very short stay there, did not at all dampen their ardor in making a noise. Several nests were also seen, which had been used earlier in the year, for I saw them August 9, 1881.

This species does not visit the Aleutian Islands. The farthest west that I could learn of their occurrence was at Belkovsky, though they may be eventually found on Unimak Island, next the western end of Aliaska.

484*b*. PERISOREUS CANADENSIS FUMIFRONS Ridgw. *Alaskan Jay.*

This bird is known by the name of *Whisky Jack* throughout the Hudson Bay territory, and *Sóyah* to the Russian-speaking element of Alaska.

It rarely occurs in the vicinity of Saint Michael's. Two specimens were obtained at the Redoubt, during my three-and-a-half years' stay there.

Along the Yukon River it is abundant and a permanent resident.

The most of my specimens were obtained from Fort Yukon, Nulato and Anvik, on the Yukon River.

I did not observe it in any other part of the country.

There is great diversity in coloration of plumage. The old birds become nearly white, from the dark sooty plumage of the young.

486. CORVUS CORAX SINUATUS (Wagl.). *American Raven.*

The American Raven is a resident throughout the Territory of Alaska. In the vicinity of Saint Michael's it is common in summer.

During the excessively cold periods of winter it retires to the interior. It visits the coast during warm, broken spells of weather in winter; in the early spring many individuals may be seen.

It does not breed near Saint Michael's that I am aware of, but on the high bluffs along the Yukon River it breeds in numbers.

The Raven seems to prefer the more thickly settled localities, and is more abundant near villages than in the less populated districts. It is common at Nushagak and on all the Aleutian islands.

At Unalashka it is extremely numerous. I have counted over two hundred individuals at one time at that place. At Atkha and Attu Islands it is also very numerous. They are the scavengers of the villages. They have a great share of intelligence; though not shy they are extremely wary, and when they assemble round a pile of offal, left from cleaning fish, which some fisherman has just brought in, they are ever on the alert. It is scarcely possible to pick up a stone to throw at them without being seen, even though the distance off might make one think he has not been observed. When the person arrives at several rods from throwing distance, the Ravens take flight, to return as soon as the intruder is out of reach.

At Atkha the natives and others have many chickens. The Alaska Commercial Company had two roosters and several hens. One of these roosters, a veritable Turk, fought the younger rooster until the latter had, in some one of his battles, lost his right eye. The loss of this eye prevented him from guarding against the sudden attacks of the older rooster, which finally drove the younger to the outskirts of the flock or else to solitude. The younger roost used to hang round some of the hens to divert them from the attentions of the older one, which finally gave him such a beating as to nearly kill him.

The Ravens used to watch these affrays, and alight within a few yards to witness the fight, but always taking good care to keep out of reach of the old rooster.

Out of revenge and a mixture of pure cursedness they would wait until the younger rooster was walking among the tall grass and sail directly over him, then drop down on the ground near him, uttering a loud *snwak*, which made the young rooster believe the old one had slipped up on him. I have seen this done over a score of times, and have seen the young rooster drop on the ground from fright.

On the approach of bad weather the Ravens retire to a high, bold precipice; and, over its top, or along its face, they go through the most astonishing, aerial evolutions, chasing each other for hours in and out, to the right and left, up and down. Their flight at such times is extremely varied with rapid beats of the wing or a short sail, a sudden halt, and turn completely over and fly back from where they started. They also turn over sidewise, generally to the right and under, coming up on the other side and continuing without halt. They frequently fly with one wing closed and the other straight up in the air.

One Raven will secure a choice bit of offal and fly away with it. Another, desiring a share, will give chase, which results in the most wonderful performances. The pursuer endeavors to fly beneath and snatch it with the claws by turning over and grabbing it from the beak or claws of the other. The first is ready to turn abruptly upward and sail for many feet directly up. The pursuer follows, and a dash to the very ground ensues, after which the chase is continued until the one drops the morsel or the other becomes tired of pursuit.

I have seen a Raven chase a duck (*Histrionicus histrionicus* LINN.) for over a mile. The Raven kept at the same distance from the duck, neither gaining nor decreasing the distance of about 20 yards between them. I had a good view of the chase, and saw the duck start out of the water about 20 yards ahead of the Raven as the latter was listlessly flying over. The Raven took after it with a "*hwak*" which urged the duck on at a rapid rate. The Raven increased his speed to keep up with all the turns and angles of the duck, which finally flew out to seaward, upon which the Raven ceased pursuit and flew along just as though nothing had happened. The Raven chased that duck for no other reason than pure maliciousness. I have reason to believe the Raven could have caught the duck if it had wanted to do so, as I had seen Ravens fly faster on many occasions, but never before had seen a Harlequin Duck in a hurry. At Atkha Island I saw a nest containing two, nearly fledged, young Ravens. The nest was placed on a ledge of a low cliff. The nest was composed of dried stalks of a species of *Archangelica*, which grows abundantly on all the islands, and some dried fronds of seaweed. The rocks in the neighborhood were whitened by the excrement of these filthy birds. The walls of the bluff formed a rather narrow angle, and when I approached the nest the clamor of the young birds was deafening.

The young are able to fly by the middle of June. The young do not assume the lustre of the adult before the next year.

The notes of the Raven are extremely varied to express surprise, danger, satisfaction, or nearly anything else, as they convey much by their note. A single male will sit on some slightly elevated knoll, and with outstretched, ruffled neck, he utters a note that sounds like that of a choking dog. Two will get close together in early spring and talk to each other for half an hour, uttering a series of *kuttle, kuttle, kuttle*, all the while.

When one has a piece of offal stolen from him he utters a *hwah*. On the wing they utter a short croak, at other times they utter *al lŭkh, al lŭkh*, which sounds like the Aleut word for *two*. The similarity of the sounds caused me to remark to a small boy, who was with me that a Raven, which had just flown by and uttered his *allŭkh, allŭkh*, had counted us correctly. The boy did not comprehend my remark until I informed him that there were but two of us and that the Raven said so as he flew by. The boy was some time laughing at the idea of a Raven counting us in the Atkhan dialect.

The Eskimo name of this bird is *Tu lú kag ŭk*. The Unalashkans call it *Ka lú kak*. The Attu Islanders call it *Ka'l gakh*. Throughout the entire Territory this bird is intimately connected with the myths and legends of the natives. They ascribe deeds of valor, heroism, sagacity, and deepest cunning to the Raven.

509. SCOLECOPHAGUS CAROLINUS (Müll.). *Rusty Blackbird.*

The Rusty Blackbird is one of the earliest land birds to arrive at this locality (Saint Michael's); May 25th being the earliest date recorded. It is not common here, and does not breed in this neighborhood to my knowledge. On the Lower Yukon River it is said to be abundant.

Along the upper part of the Yukon River, especially in the neighborhood of Fort Yukon, this bird is abundant. It arrives there by the 10th of April and remains until October.

The iris is white; bill and feet black.

The Eskimo name of this bird is *Káth ka gá yŭk*.

I did not observe this Blackbird on Aliaska nor on the Aleutian Islands.

515. PINICOLA ENUCLEATOR (Linn.). *Pine Grosbeak.*

The Pine Grosbeak is a resident of the interior and wooded districts of the entire Territory of Alaska. It occasionally visits the Redoubt of St. Michael's during a warm period of weather in winter.

It is very plentiful along the Yukon River, especially at Nulato, Anvik, and Fort Yukon. The specimens were all obtained from one or the other of those places.

The fresh specimens that came to me in a frozen condition presented the following coloration: Bill dark; tarsus, toes, and claws darker; iris black.

It feeds on seeds; preferably those from the cones of the spruce.

I observed several individuals of this species among the scattered clumps of spruce trees at a few miles from Nushagak, on the river of that name flowing into the head of Bristol Bay.

516. PYRRHULA CASSINI (Baird). *Cassin's Bullfinch.* [See Plate VII.]

(Dr. L. Stejneger has kindly furnished me, in February, 1882, the following remarks upon the status of the present species):

"Prof. S. F. Baird's *Pyrrhula coccinea* var. *cassini* (Trans. Chicago Acad. I, 1868, p. 316), has been the subject of several interpretations.

Mr. Tristram (Ibis, 1871, p. 231) considers it to be entitled to specific rank, while other authors regard it as belonging either to *Pyrrhula cineracea* Cab. or to *P major* Brehm (= *coccinea* De Selys).

It would, therefore, be interesting to know to which species this only American specimen should be referred.

I have minutely examined Professor Baird's type, which is deposited in the collection of the Smithsonian Institution.

The specimen is not in the best condition, the outermost tail feather on one side and the innermost remex on one wing being lost.

It appears from examination (as also Mr. Dybowsky and Professor Cabanis, Jour. für Ornith., 1874, p. 40, have concluded before me) that the American specimen is a female. That the specimen is labeled as an adult male is in all probability founded on error which should not mislead us. It is not the first instance that the label has given erroneous information concerning the sex.

Measurements of the specimen give: Culmen, .40; wing, 3.75; tail, 2.85; tarsus, .74; middle toe, .48 inch.

Forehead and top of head lustrous blue-black, this black extending as a narrow line entirely round base of lower mandible and expanding to about three times its width between the rami of the lower mandible. The tail, including the upper coverts, is lustrous blue-black above and slate-black below. Wings slaty on the remiges, becoming the color of the tail on the tertials. The outer web of the first primary is gray, with slightest tinge of red. The primary coverts are dark ash and are thus quite conspicuous. The greater wing-coverts are broadly edged with bluish-black and broadly tipped with grayish-white. Nape, back, scapulars, lesser and middle wing-coverts uniform cinereous. Rump and lower tail-coverts pure white. The lower parts reddish-gray, becoming decidedly vinaceous on the flanks. The auriculars tinged with red. Bill brownish-black; tarsi brown; toes darker.

The specimen in question is neither a male of *P. major* nor *cineracea* nor *griseiventris* Lafrsn.

If it be a male it would be quite a new species, of which the male would be almost precisely like the female of *cineracea*, as I propose to show below.

When we shall decide on this case we prefer without hesitation the first alternative as being the most natural and probable one.

The under parts are of the same color, excepting a somewhat purer gray than the same sex of the Great European Bullfinch, *P. major*. The color of the back is pure cinereous, without the brownish wash of *P. major*. The white of the rump embraces an area in width of .9 inches (22 mm.). The outer web of the first primary has an edge of gray. The length of the tail-feather are 2.85 inches (72 mm.).*

In some of these particulars, which the specimen examined has in common with the female of *P. major*, it differs from *P. cineracea* in which the white of the rump embraces an area of 1.38 inches (34 mm.), while the light border on the outer primary is nearly always wanting. The first primary,

* "Baird, Brewer, and Ridgway, in Hist. N. A. B., I, p. 457, give the length of the tail as 3.25 inches (82 mm.). The difference of the length arises from the different manner of measurement. I myself (as does Mr. Dybowsky) measure the tail-feathers from the base of the quills at their insertion and not, as in the work mentioned above, 'from the coccyx inside the skin.'"

with very [illegible] In the same [illegible] the measurements [illegible] the tails of two [illegible] specimens [illegible] 285 [illegible] [illegible] specimens [illegible] which [illegible] [illegible] [illegible]

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LOXIA LEUCOPTERA (GMEL.) FIRST PLUMAGE.
PYRRHULA CASSINI (BAIRD). ADULT FEMALE.

with very few exceptions, is shorter than the fifth. In the same manner the measurements best agree with those of *P. major*. The average length of the tails of twenty-nine females was found by Mr. Dybowsky to be 2.85 inches (72 mm.). The wing being 3.58 inch (90 mm.) or precisely the same numbers which I have given above. On the other hand the specimen agrees so closely with the colors of the female of *cineracea* that there can be no doubt but that it is the female of *cineracea*. The differences noted above are only such as also occur in occasional female individuals of *cineracea*. (See E. v. Homeyer, Jour. für Ornith, 1879, p. 178.)

There are also two more marks by which Professor Baird's bird agree with *P. cineracea*, for it lacks the red spot on the innermost tertial. The spot in that bird being gray, with a bluish-black spot at the tip, and has the tips of the greater wing-coverts gray and not white. It may, however, be well to state that occasional individuals of *P. major* also lack the red spot on the inner tertial. (See Dybowsky and v. Homeyer, l. c.).

The white on the outer tail-feather is rather large and thus agrees with the majority of individuals of *cineracea*. *P. cassini* has nothing to do with *P. orientalis* TEM. (=*griseiventris* LAFRSN). This is a smaller bird and much nearer allied to the small European form as will be understood from the following comparison which I had the opportunity of making in the museum of the Philadelphia Academy of Nat. Sciences:

The specimens of *Pyrrhula orientalis* TEMM. here described are a male and a female, numbered 777 in the Phil. Acad. Nat. Sci., and were obtained from Japan.

The male of *P. orientalis* TEMM. is especially distinguishable from the male of *P. europæa* (the small species) by the gray of the back being less pure, it being strongly tinged with rose-red; also by the black cap extending less farther posteriorly. The color of the throat and cheeks is purer and more glossy rose-red, while the breast and remaining under parts are strongly shaded with gray. The red color extends to the crissum without becoming less intense. The tips of the greater coverts are pure gray, not white or whitish. The innermost tertial has no red spot. Measurements of the male give: Culmen, .40; wing, 3.30; tail feathers, 2.40; tarsus, .64 inch.

The female of *orientalis* is distinguishable from the female *europæa* in the same manner as the male by the gray tips on the greater wing-coverts and wanting the red spot on the inner tertial. The back is more tinged with brown, duller and more reddish than in any of the four females of *europæa* now before me, in which the shade of gray in *europæa* is more fulvous, the cap somewhat shorter, the auriculars, chin, and throat more reddish—just the same parts which in the male are more rosy. Measurements of the female give: Culmen, .37; wing, 3.35; tail feathers, 2.44; tarsus, .70 inch.

The synonomy of *P. cassini* will, consequently, stand as follows:

1831.—*Pyrrhula rubicilla* Pall. Zoogr. Russo-Asiat., II, p. 7 (♀ partim.).

1869.—*Pyrrhula coccinea* var. *cassinii* Baird, Trans. Chic. Acad., I, 1869, p. 316.

1871.—*Pyrrhula cassini* Tristr., Ibis, 1871, p. 231.

1872.—*Pyrrhula cineracea* Cab., Jour. für Ornith., 1872, p. 316.

Figures. Transactions Chic. Acad., I, 1869, Pl. XXIX; Cab. Jour. f. Orn., 1874, Pl. I."

While in Alaska I made strenuous endeavors to obtain specimens of *P. cassini* Baird, but failed to procure them. The question of the relationship of the species referred to may, however, be considered as settled, as Dr. L. Stejneger, since he wrote the above, has had the opportunity of comparing Baird's type of *cassini* with an undoubted specimen of *cineracea*, and finds his identification to be correct.

521. LOXIA CURVIROSTRA MINOR (Brehm). *American Crossbill.*

I had the good fortune to obtain a specimen of the American Crossbill at Saint Michael's on August 4, 1875. It was sitting on a weed near the base of the sun-dial, back of the inclosure.

Measurements of the fresh specimen were as follows: 5.75 by 10 by 3.25 by 2. Iris black, feet and bill dusky, male, adult.

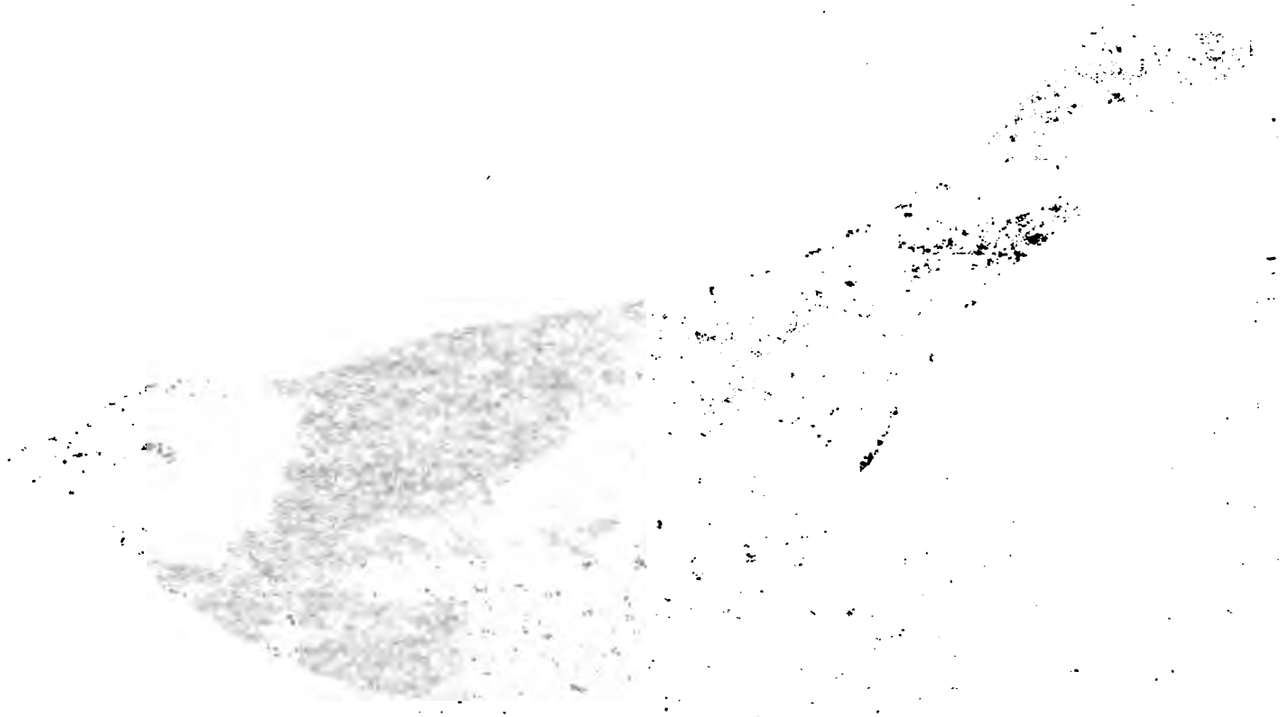
This bird is extremely rare in this locality, as some natives to whom I showed it declared it to be the first one they had ever seen.

This species was not obtained by Messrs. Dall and Bannister in the Yukon Territory.

This is the only individual ever obtained north of Sitka, nearly 600 miles further south than Saint Michael's.

[illegible]A LLUCOPTERA (Gr[illegible]
[illegible]ULA CASSINI (F[illegible]

LEUCOSTICTE GRISEINUCHA (BRANDT). ADULT, BREEDING PLUMAGE.



LEUCOSTICTE [illegible] (Brandt) Adult, Upper & Female.

522. LOXIA LEUCOPTERA Gmel. *White-winged Crossbill.* [See Plate VII.]

The White-winged Crossbill is abundant in the interior of the Yukon district and other wooded parts. It occasionally visits the neighborhood of Saint Michael's, though not in numbers, as only an individual, or a very small flock, may be seen in spring or fall. It then acts as though it was in a strange place and anxious to get away, for it was very shy.

Measurements of a fresh specimen obtained from Nulato were as follows: No. 213, 5.5 by 11 by 3 by 2.6; iris, bill, feet, and claws black. Dated March 15, 1875.

LEUCOSTICTE GRISEONUCHA (Brandt). *Aleutian Leucosticte.* [See Plate VIII.]

This species is common on all the Aleutian Islands, including the Pribylof Group, Sannakh, mainland at Belkovsky, Unga Island, and was also observed at Kadiak Island.

At Attu Island the bird occurs rather sparingly near Chichagof Harbor, but toward the western end of the island it is more abundant. At Unalashka, in the neighborhood of Iliúliuk village, the bird is also not often seen. At the village on the harbor of Nazan (Atkha Island) the bird is rarely seen, though at a distance of a few miles from either of these places just mentioned the bird is common enough. At the villages of Saint Paul's Island and that of Saint George Island the bird is abundant in the so-called streets. I have counted as many as twenty individuals around one building at Saint George's Island; and some of them within few feet of several persons. They seemed regardless of the presence of man; while at other places they were seldom seen and were then shy, taking long flight when approached.

This bird prefers the bold, ragged cliffs along the sea-shore. They are constantly in motion, either on the wing, flying in sweeping, long curves, sometimes near the earth, to mount thirty or forty feet at a single effort, alighting on some projecting ledge of a bluff to search for food, and away again to alight for a moment on a weed stalk. Their nest is built on a small protected ledge of a bluff, or else in a small crevice.

A nest was obtained by me from a small cleft of a rock on the side of a high bluff. It was composed of small pieces of wild-parsnip stalks, coarse grass stems, and finer blades of grass to form the lining. The nest is not elaborate, the material being somewhat carelessly arranged. Four (sometimes five) white eggs are laid in the early part of June. The young are able to fly by the first of August.

I believe that but one brood is reared in a season. In the latter part of August and during September small flocks, numbering never more than eight or ten, have been frequently observed, but I was led to consider these companies as the parent birds with the brood of young just reared. On the approach of winter these birds separate, so that during the winter more than one at a time is rarely seen.

In April they seem again to assemble in small flocks of not more than five to eight in number and remain so until the mating season separates them.

The number of birds seen in winter is much less than that seen in summer; hence the conclusion that part of them migrate, but to what locality is yet unknown, as their habitat is restricted to Kadiak on the east, Attu on the west, the Pribylof Islands on the north, and the southern sides of the Aleutian Islands and those islands to the south of the Aliaska Peninsula forming the southern border of their habitat.

527*a*. ACANTHIS HORNEMANNII EXILIPES (Coues). *Hoary Redpoll.*

The Hoary Redpoll is a common bird throughout the entire Territory of Alaska. The number at any given locality scarcely changes in winter or summer.

Along the less protected parts of the coasts, where food is not so readily found in winter, the birds go to the interior for a time, and only along the coast is it imperfectly migratory. In the wooded districts it is a permanent resident.

As early as March great numbers visit Saint Michael's, resorting to the bushes, weed stalks, and denuded areas of ground.

This species breeds at Saint Michael's.

The Eskimo name of this bird is *Ōk fēk tá gak*, or dweller among the *Ōk fēg at*, or alder patches.

528. ACANTHIS LINARIA (Linn.). *Redpoll.*

The common Redpoll is a resident of all parts of Alaska excepting the Aleutian Chain. At the latter place (Aleutian chain proper) this species is a summer visitor only, though breeding here. It makes its appearance in April and remains until the latter part of October. It was never observed west of Unalashka Island.

In the Yukon district it is one of the commonest birds to be met with. It breeds wherever found in the summer.

The male birds with their brilliant rosy breasts and crown, their cheerful twitter makes them a general favorite.

The rosiness is not fully developed until after the second year. The young birds resemble the females of the second or third year, though old females also have a faint rosy tinge on the breast.

Their sociability was so developed that they would sit on the wind-vane, placed on a high staff and turn round with the vane as the wind veered or backed. The yards often contained a hundred at a time. They were quite fearless and only took flight for a few feet.

The nest and eggs were not obtained. The natives assert that it breeds at Saint Michael's, among the bunches of weeds and grasses.

The Eskimo call this species by the same name as the Hoary Redpoll. The natives recognize no specific differences between the two.

My own observation tends to the same belief. They are so intimately associated that only the most rigid comparisons separate them in even a slight degree.

534. PLECTROPHENAX NIVALIS (Linn). *Snowflake.*

This pleasant and familiar little bird may be seen at Saint Michael's, or in its vicinity, at any season of the year, excepting during the protracted periods of coldest weather in midwinter. It is very abundant in the spring months of May and June. In April it is usually found in large flocks on the low ground near the Canal. As the snow is melted off of the higher grounds it repairs there to procure the seeds that remain from the last year. By the 15th of May the birds begin to separate into pairs and seek the cliffs and bluffs, on the sides of which they build their nests in June. The nest is placed on some small jutting point from the cliff, or sometimes in a chink or crevice. I have seen only deserted nests. The young are able to fly by the 1st of August, and they, with their parents, remain together until October, when they assemble into larger flocks, sometimes of hundreds in number.

The Snowflake is irregularly migratory from the coast to the interior in the higher latitudes, and are permanent residents of the Yukon District.

I observed this bird at Nushagak on Bristol Bay in June, 1878, under such circumstances that led me to conclude it was breeding.

At Unalashka Island the Snowflake was seen on the eastern end of the island only in April and May and never during the summer months. While at Chernovsky (village) I saw this bird abundant in the middle of June, 1880. At Akutan Island I have seen it in July and September.

Among the western islands of the Aleutian Chain the Snowflake is a permanent resident, breeding there in great abundance at Atkha and Amchitka. At Attu Island the bird is plentiful at all seasons, and in the hardest weather may be seen on the gravelly beach eagerly searching for food. They breed here in numbers. The note of the male during the breeding season is a clear whistle prolonged through several notes and cadences. Its note can be heard a great distance.

The female utters only a chirp, which is also the note of the male at other than the breeding season.

Among the Aleutian Islands the summer plumage is assumed in the early part of May, and in the latter part of May at Saint Michael's.

I observed this bird at Belkovsky in July, 1881, and at Kadiak in the early part of August, 1881. At the latter place young birds of the season were abundant.

The Eskimo name of this bird is *A móu ō thlĭg ŭk*, and refers to the white plumage contrasted with the black.

536. CALCARIUS LAPPONICUS (Linn.). *Lapland Longspur.*

The Lapland Longspur arrives at Saint Michael's from the 5th to the 15th of May. A few arrive at first, and before a month elapses it is the most abundant land bird seen in that locality. They frequent the lower grounds on their arrival and retire to the higher levels as soon as the snow is sufficiently melted. They have but little fear of man, and scarcely hop more than a few feet from the path even when they have but just come.

The mating season begins soon after their appearance. The pair usually select some open spot that may be only a foot or so above the general level of the ground. The male takes possession of the highest point of that ground and reserves it for himself during the season of incubation. The nest is usually placed in a tuft of grass or dry moss. It is composed of grass and lined with feathers, forming a snug home. The number of eggs is four or five, laid by the 10th of June. The young are able to fly by the 25th of July. A second brood is often reared, and in my belief it is only the earliest arrivals that rear the second brood, as those pairs which I had earliest noticed on the nearer selected spots of ground were the ones that certainly had hatched two broods.

The male is most assiduous in his attentions during incubation. He seeks the highest part of the ground, and dashes into the air, to circle round and round the nest in gradually decreasing spiral flight, while he utters a trilling note, a beautiful sound, then alights near by and utters a chirping *tsweep* as he walks over the ground. In a few minutes he repeats the flight and song. This is continued all the day, usually the first bird-song heard in the morning and the last at night. The last part of September sees these birds preparing for departure. They are gone by the 5th of October.

The Lapland Longspur is abundant on the westernmost of the Aleutian Islands. At Attu it is very abundant, at Amchitka scarcely less so, and especially abundant at Atkha. I have never observed it at Unalashka at any season. At Belkovsky it was seen in July, 1881, and at Kadiak Island it was abundant in August, 1881. Among these were many birds reared that season.

542. AMMODRAMUS SANDWICHENSIS (Gmel.). *Sandwich Sparrow.*

This little Sparrow is one of the earliest arrivals at Unalashka, usually by the 10th of May.

By the 1st of June they become quite abundant. They frequent the grassy bluffs and sandy tracts along the beach.

They breed in June, in the grass. The nest and eggs were not obtained by me, though several nests were shown to me and asserted to belong to this bird, but as I had no positive proof I could not accept them as such.

The young are able to fly in the latter part of July, though some young, that were just fledged, were seen as late as the middle of August. I suspect that more than one brood is reared in a season.

On the eastern Aleutian Islands this Sparrow is quite common. At Unalashka Island many are to be found early in May.

They are especially abundant on the low portage across the middle of Amaknák Island, lying in the northeast part of Captain's Harbor.

At Atkha Island I saw but few of these birds in 1879, and none farther west of this place until I visited Attu Island in 1880 and saw a few of these birds. Young birds, just able to fly, indicated they had been reared on the island.

542*b*. AMMODRAMUS SANDWICHENSIS ALAUDINUS (Bonap.). *Western Savanna Sparrow.*

The habits and arrival of this species are identical with that of *A. sandwichensis*. There is nothing except in coloration to distinguish them. This species was not obtained at the Aleutian Islands, but at Saint Michael's is as common as the other species.

Upper bill dark; lower pale; feet pale.

555. ZONOTRICHIA INTERMEDIA Ridgw. *Intermediate Sparrow.*

This sparrow arrives at Saint Michael's early in June. It is quite abundant among the alder patches on all parts of the island of Saint Michael's. It breeds here, as young birds were obtained in the first week of August in fully fledged condition. It leaves this vicinity in the latter part of August. I observed this bird at the mouth of the Kuskokvim River in June, 1878, and during the

latter part of the same month at Nushagak, on Bristol Bay. At the latter place it was very abundant along the thickets that fringe the streams of the low grounds. It does not visit the Aleutian Islands. The Eskimo name of this bird is *Cha páng akh tu lē á gak*, and signifies the small *Cha páng ŭk*, or *Passerella iliaca*.

557. ZONOTRICHIA CORONATA (Pall.). *Golden-crowned Sparrow.*

A pair of these birds were shot in June, 1876, on the western end of Whale Island, near Saint Michael's. They frequent the edges of thickets of alder which grow on the sides of steep hills or hang over the brows of cliffs. They are also found at the bases of high cliffs near the water's edge, seeking food among the decaying sea-weed thrown up by the waves. They are not common in this vicinity, as these two were the only ones obtained at this place, although this pair would undoubtedly have bred here. In the interior they are not common, as I obtained only one specimen from Fort Yukon, and none were seen in other parts of the country. Several individuals of this species were observed near the village at the fishing station of Karluk, on the northwestern shoulder of Kadiak, in the early part of August, 1881.

559*a*. SPIZELLA MONTICOLA OCHRACEA Brewst. *Western Tree Sparrow.*

The Western Tree Sparrow arrives at St. Michael's by the 1st of June and remains only two and a half months. It breeds in the alder thickets that skirt the small lakes on the low grounds. It is quite common; and, in the breeding season the male has a beautiful twittering song. I observed this Sparrow at Nushagak, Bristol Bay, in June, 1878. In the interior it is quite abundant. At Fort Yukon and Nulato it is especially so. The Eskimo name of the Tree Sparrow is *Mŭt chŭk ŭk*.

560. SPIZELLA SOCIALIS (Wils.). *Chipping Sparrow.*

Several specimens of this Sparrow were obtained from Fort Yukon in June, 1876. It is not found on the coast in the vicinity of Saint Michael's, nor was it observed at Nushagak in June, 1878. It does not occur on any of the Aleutian Islands, to my knowledge.

567. JUNCO HYEMALIS (Linn.). *Slate-colored Junco.*

The Slate-colored Junco is rarely common at Saint Michael's. It is to be seen only in May or November. In the interior it is quite common, breeding at Fort Yukon and Nulato. I do not believe that it breeds anywhere along the coast of the Yukon district. It is not a resident of the district, and has not been yet detected on Aliaska nor on the Aleutian Islands.

567*a*. JUNCO HYEMALIS OREGONUS. (Towns.). *Oregon Junco.*

A single specimen (female) of the Oregon Snowbird was obtained at Unalashka Island, April 8, 1879. The bird was shot by a native at the mouth of the creek back of Iliuliuk village. It is extremely rare, as the native asserted it to be the first time he or his companions had seen such a bird. It was undoubtedly a straggler, from the mainland, and blown to this place by the extremely boisterous weather of that spring.

I have not observed this bird anywhere else on the Aleutian Islands.

Numerous individuals of this species were seen at Karluk, on the northwestern shoulder of Kadiak. The birds were quite familiar, hopping about the village and among the stakes which supported the stages of drying fish.

582. MELOSPIZA CINEREA (Gmel.). *Aleutian Song Sparrow.*

The Aleutian Song Sparrow is a constant resident of the Aleutian Islands, the peninsula of Aliaska, and the adjacent islands lying on the south side as far eastward as Cook's Inlet. It does not occur to my knowledge on the north side of the peninsula. It is strictly littoral in its habits, never going far into the interior of an island or the mainland of the peninsula. It prefers the vicinity of cliffs and precipices or the beach covered with immense bowlders. During the breeding season it is found abundantly on the low swales which are heavily clothed with wild rye.

Mating occurs late in April, and incubation about the first week in May. Young birds, able to fly a few yards, were obtained as early as the 12th of May and as late as the middle of August.

Two, and sometimes three, broods are reared in a single season. The nest is placed in a tussock of grass, either on a steep hillside or on a ledge of some cliff. Again the nest is occasionally found in the low places near the water's edge of some small cove. There is great diversity of location sought by this bird in nesting habits. The nest is well built of grass, coarse blades for the foundation and finer ones as the nest approaches completion. The inside of the nest is lined with feathers of various birds.

The number of eggs varies from four to six; the latter number is rare, five being the usual number.

The young birds are fed exclusively on insects for the first few days. The old birds are quite expert in seizing insects on the wings. I have frequently seen them dart from a prominent rock to secure a passing lepidopter. The large gallinipper is a choice morsel for them, and these birds may frequently be seen hopping, along the paths or edges of grass patches, in search of them and other insects.

This Sparrow is not shy, as it frequently alights on the window-sill to search about the turf, piled against the houses, for food.

I frequently threw out pieces of bread or cracker for these birds, and soon taught them to know where they could get something on days of bad weather; and those days come with sufficient frequency.

The house-top was a favorite place for them to alight early in the morning to sing. One bird delighted to sit on the wind-vane, while a gentle, unsteady wind would swing him round and back, evidently to his great delight, as he constantly uttered his song, which I have in vain tried to imitate, as it consisted of such rapid modulations that I could never catch it. They will at times sing part of their song and stop short, as though interrupted, look around for a few seconds, and begin where they left off. The song is usually sung in answer to that of a rival male. After being repeated many times one or the other of the males is certain to approach the other and again repeat his song.

The males are as a general thing peaceable. I saw two males which were a long time in settling some variance between them. They began early in March to alight near each other and remains steadfastly, within two or three feet of each other, each waiting a movement of the other, which would be immediately taken advantage of. Any retreat was closely followed up, and the pursuer was frequently brought to an abrupt stand by the sudden turning of the one pursued. When either of them took flight the other immediately attacked him by pecking and attempting to catch the wing feathers in his claws to bring him to the ground. Only once did I see them in close combat, and as they soon parted without apparent damage, and again that same day renewed the chasing on the ground, I concluded they did not have a very serious matter between them. This warfare between these birds continued into early May, when they, being absorbed in their household duties, lost sight of.

During the severest weather these birds seek shelter under a projecting bunch of grass on the base of a bluff, or under the eave of the house, or edge of the thatch; during the severest gusts, of wind and snow, these pleasing birds will be singing their song, unmindful of storms or cares.

The name of this Sparrow in the Attu language is *Chĭk ché ŭkh*, and refers to its note.

A careful comparison of individuals of this species from all the principal islands of the Aleutian chain and from the islands south of Aliaska, including Kadiak, reveals no appreciable differences, but they are notably differently colored, and average slightly larger than *rufina* from Cook's Inlet, the mainland, and the adjacent islands south of the inlet.

In *cinerea* the upper surface is brownish-plumbesus, outer surface of wings somewhat more brown, the greater coverts slightly rufescent. Interscapulars with medial broad but obsolete streaks of sepia-brown; crown and upper tail coverts with more sharply defined and narrower dusky shaft-streaks. Beneath grayish-white, much obscured by brownish-plumbesus laterally. A whitish, supraloral space, but no appreciable superciliary stripe; a whitish maxillary stripe, beneath it an irregular one of dusky sepia; irregular streaks of dark grizzly-sepia on breast and along sides, blended into a broad crescent across the jugulum. The female has more grayish white on the lower parts, especially on the abdomen; otherwise there is no exterior differences in the sexes. The autumnal plumage is little darker, but similarly distributed, and with less whitish on the lower parts.

585. PASSERELLA ILIACA (Merr.). *Fox Sparrow.*

The Fox Sparrow arrives at Saint Michael's by the 8th of June. Breeds here in the thickets of alder round the edges of the small lakes. It is not abundant, though in some restricted localities several pairs may be found during the breeding season. The nests are built in the densest parts of the thickets, which renders them extremely difficult to find.

A male bird was shot in the edge of a clump of bushes on the 17th day of July, and in its bill were over a dozen gallinippers, which had been divested of their wings. They were intended for food of very young birds of this species. In the interior, and especially at Fort Yukon, this Sparrow is quite common.

It leaves the vicinity of Saint Michael's in the latter part of August.

This Sparrow is a beautiful songster. The Eskimo name of this bird is *Cha pañ̇ ŭk.*

613. CHELIDON ERYTHROGASTER (Bodd.). *Barn Swallow.*

The Barn Swallow arrives at Saint Michael's about the 7th of June. A few of the more intrepid ones may arrive some few days earlier. By the 15th of the month as many as forty pairs have been counted in the dusk of the twilight, which is light enough to see to read by at midnight during this season of the year.

The earliest arrivals dart into the usual places occupied by them as though they were the identical birds hatched there the preceding year. On their arrival they are loud in the manifestations of joy for the termination of the long journey lately winged to the distant north.

In the spring of 1876 snow squalls and frosty weather held until late in June. The poor birds had had no opportunity to recover their exhausted condition, resulting from their long flight to the north. Many of them succumbed to the chilling weather, while others, benumbed by the cold, permitted themselves to be handled and seemed to enjoy the warmth given out by the hand, as they nestled closely between them, without evincing any fear.

They build their nests on the beams projecting from the old houses and under the eaves of the other buildings. Nidification begins as soon as the sun thaws the ground sufficiently to allow them to obtain the mud with which to construct their nests. After that the yard is searched for feathers with which to line it. At this season of the year many game birds are killed for food; hence the yard has various kinds of feathers in abundance. The swallows appear to delight in picking up a feather, carrying it high in the air, and drop it to catch it again as it flutters downward. Oftentimes two or more swallows will join in playing with a large feather, from the breast of a swan. I have seen one swallow chase another, which was carrying one of these large feathers, snatch it from him, and only to be followed in most wonderful aerial evolutions by the one from which it was taken. This sport continues for an hour at a time.

The Russians protected this bird; hence it seems to have less fear of man in that region than in warmer climes.

My window was favorably situated from which I could observe these birds collect mud, for their nests. I never before knew how it was done, but supposed that they picked the mud pellet up between their beaks. I have watched them for hours at a time, and when my eyes were not to exceed four feet from the birds at work. They flew to the puddle of water and mud, stepping over the ground until they found a place having the proper consistency, would look up at me as if to say that this will do. The neck is stretched out nearly its full length and the head kept with the bill at a right angle to the neck. A slight pressing of the beak into the earth and a tugging twist of the body gently pulls toward the bird a small pellet of mud. The bird then lowers its neck to the ground with the beak on the opposite side of the pellet (or on the side next the bird.) The beak is now thrust under the pellet until the mass of mud is pushed onto the top of the bill and rests against the forehead. This is the manner in which it obtains the mud and is in position to enable the bird to deposit it. The mud is also smeared with the top of the beak.

The Swallow frequently rears two broods in a single season. The first brood is fully fledged and on the wing by the 15th of July. The second brood is ready for flight by the 25th of August They remain around the Redoubt until September 10th to 20th. Previous to their departure they assemble on the buildings, in the evenings and early morn, filling the air with their twitter. The

late young are sometimes not ready to undertake their long journey. The older ones gather round it and actually push it from the building to make it fly, as it seems to fear to trust itself to its wings.

Their arrival in spring is always welcomed by the people who live in the Redoubt, while in the fall some one will remark: "It has been some time since I saw a swallow." Each person fully understood the thought that occupied the other's mind during the momentary silence that followed the remark. It meant that winter was near; how will it be, and what shall we do?

The distribution of the Barn Swallow in Alaska is well made out. It is a regular visitor to all littoral Alaska, and as far along the northern coast as Unalakhlit in latitude 65° north, while in the interior it is found all along the immense Yukon River. Along the peninsula of Aliaska it is sparingly found. It appears in scanty numbers at Iliuliuk village, on Unalashka Island. It breeds there. During the spring of 1879 not one was seen at this place, neither were there any seen during the summer or fall. It was an exceptionally boisterous year; gale after gale rapidly succeeding the other possibly deterred the usually venturesome bird from coming there. This is the only species of swallow found on any of the Aleutian Chain proper, and is not known west of the island of Unalashka.

While at Atkha Island in 1879, and at Attu Island in 1880 and 1881, I made special inquiry concerning this bird, and only those persons who had visited Unalashka Island and saw the bird there knew of its existence. The absence of knowledge of this bird at either of those places shows conclusively that neither it nor its congenors visit those places.

At Nushagak (Bristol Bay) the Barn Swallow is found in considerable numbers. It breeds there, as I saw their nests in June, 1878.

The *Hirundo Unalashkensis*, Gmelin, is certainly not referable to any known America swallow.

614. TACHYCINETA BICOLOR (Vieill.). *Tree Swallow.*

On several occasions I observed this Swallow flitting about the buildings at Saint Michael's, during the months of August and early September. The lateness of the season led me to conclude they were birds having reared their young in the interior portions of the country, and were now on their way to the southward, preferring, through some freak or fancy, to return by the coast rather than the interior.

At the trading station on the Nushagak River I saw a great many, certainly a dozen pairs, of these birds swiftly scouring the edges of the river banks and upper dry lands to obtain the myriads of insects to be found there.

This species was not observed in any other portion of the country.

616. CLIVICOLA RIPARIA (Linn.). *Bank Swallow.*

The Bank Swallows were but occasional visitors to the vicinity of Saint Michael's, where it was observed only during the middle of the summer season. It came at very irregular intervals and remained but few hours.

They were quite plentiful along the high banks of the lower portion of the Nushagak River in the latter part of June, 1878. They were intimately associated with *T. bicolor* in their search of food. Unfortunately I was unable to obtain specimens from either locality.

618. AMPELIS GARRULUS (Linn.). *Bohemian Waxwing.*

This bird is only an occasional visitor to the coast. A single specimen was brought to me by a native, who said he had killed it near Unálakhlit, on Norton Sound, and further asserted that it is rare in that locality.

Other specimens were obtained from Nulato and Fort Yukon. At the latter place it is not at all common.

In the neighborhood of Anvik on the Yukon River, and at Kolmakof Redoubt on the Kuskokvim River, it is reported to be common.

The Eskimo name of this bird is *Tĭk ē chē ú wŭk*, and means a killer of small birds. The clotted blood of its victims may be seen on the wings of the Waxwing.

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MOTACILLA OCULARIS (SWINH.) WINTER ADULT (IN BACKGROUND) AND YOUNG IN WINTER.

watching the vessel, which was to take me to Unalashka Island, enter the harbor. I saw a bird just beneath the window and on the ground, not more than seven feet from my eyes. At the first glance I supposed the bird to be *Plectrophanax nivalis*. A moment sufficed to convince me that it was not. I ran to get my gun; and, as I opened the door, of the entry-way, to get out, the door opened directly on the bird, which, with a chirp precisely like that of *Budytes flavus leucostriatus*, flew off to a distance of 75 yards and alighted. I approached as nearly as I dared and fired at it, but failed to obtain it, as the gun was loaded with No. 3 shot. It flew off beyond the hills and was not seen again. The bustle and preparation for departure prevented me from following the bird.

I had ample time to identify the bird as a *Motacilla*, and one new to my list. The black on the head and neck, together with the grayish on the other portions of the body, and the manner of gait, were sufficient to cause it to be recognized.

Mr. W. H. Dall collected a specimen of this species at Plover Bay, Siberia, and one was collected by Dr. T. H. Bean, of the U. S. Fish Commission, in the same locality in 1880.

Seebohm (Ibis, 1878, p. 346) says: "I have a skin of *Motacilla amurensis* Seeb., collected by Wossnessensky on the 23d of April, 1845, upon Oorogan Island, possibly either one of the Kurile or one of the Aleutian Islands." I have endeavored to find the geographical position of Oorogan Island and have failed. It may possibly be one so small in size as to be known only to those who visit that locality.

An intimate acquaintance with the names of all the Aleutian Islands compels me to assert that it is not to be found among the Aleutian Islands, unless it be some island which, from the spelling, "Oorogan," is not now recognizable, nor is there any island of the chain which approaches it in sound, as the Aleutian languages have no "R" in their vocabulary. It is necessary, however, to state that Wossnessensky did, about that time, collect specimens of natural history along the coasts of the Okhotsk Sea for the Imperial Academy. And Grewink, in Beschaffenheit der Nord-West-Küste Americas, St. Petersburg, 1850, says:

Im August 1839 geht J. G. Wosnessensky ab, besucht 1840 und 1841 Neualbion, Ober- und Untercalifornien, 1842 und 1843 die Aleutischen Inseln, mehre Inselgruppen im Beringsmeere u. den Kotzebuesund, 1844 die Kurilschen Inseln; 1845 und 1846 bereist er die Ochotsker Küste, 1847 und 1848 die ganze Halbinsel Kamtschatka und kehrt von hier über Sitcha Juli 1849 mit dem Schiffe Atcha nach St. Petersburg zurück.

A second reference to the voyages made by Vosnessensky is to be found in Nouvelles Annales des Voyages, Paris, A. Bertrand, 1846, tome III de la Collection V^e^, série VI, tome II, p. 250.

Dans la séance de l'Académie Impériale de Saint-Pétersbourg (classe physico-mathématique), du 19 septembre dernier (1^er^ octobre, n. et.), une lettre de M. Etholin a fait connaître les dernières courses du préparateur Voznessensky. Dans l'été de 1845, après avoir visité les îles Kouriles, le voyageur a mouilleé dans le port de Petropaulovsk, au Kamtchaka; puis de là il s'est rendu aux îles de Behring, à Atta, Atkha, Saint-Paul et Saint-Georges, et il est revenu en automne à Novo-Arkhangbelsk. Là M. Etholin lui a fourni l'occasion de visiter les détroits des Koloches. Au moment du départ de la poste, Voznessensky se disposait pour un voyage à Okhotsk et dans le golfe d'Alan, d'où il devait revenir à Petropaulovsk. Quarante-deux caises, renfermant la récolte des dernières courses du zèle naturaliste, étaient parties pour Saint-Pétersbourg par la voie de Londres.

696. BUDYTES FLAVUS LEUCOSTRIATUS (Hom.). *Siberian Yellow Wagtail.*

This bird arrives about the 12th of June; a few days earlier or later, depending on the opening of the spring. Immediately on its arrival, in but few numbers, they are very shy, alighting on the bare areas of ground to fly away at only an instant of rest. Few females arrive with the earliest visitants. But few days elapse before mating begins. A pair is no sooner mated than the labor of making their nest commences. A tussock of grass, on which the dead stems and blades have fallen over and form a cover, is the place selected for the nest. The nest is constructed of fine grasses with few grass roots, built into a compact form, having the edges or walls of the nest well carried up, so that the sitting bird is nearly obscured in her nest.

Eggs are sometimes laid before the nest is completed. The process of construction goes on until the open space, under the overhanging grass, is filled with the bulk of the nest. The overhanging grass-blades are then drawn over the nest, leaving only a small rounded hole between them as an entrance to the nest.

The complement of eggs varies from five to seven, the latter number being the usual number in the nest.

Incubation lasts ten to thirteen days. The young birds are fed exclusively on insect food. They are able to fly in fifteen to eighteen days after hatching.

The earliest birds sometimes hatch two broods of young in aseason, as young just able to fly have been observed as late as August 18th.

By the 1st of September the birds of this species collect into small flocks, of eight to twenty in number, and remain until as late as September 21st, at which date they have about all disappeared. They generally signalize their readiness to depart by assembling on the low banks, bordering the beach, and dart high into the air to return to the same, or similar, place after a few minutes time. At this particular season of the year they are extremely wary and difficult of approach. The only note ever heard was an impatient chirp, uttered only while on the wing. On the ground the bird walks, with a screwing motion, the head and neck moving back and forward with each step, while the tail is constantly tilting up and down.

There are no seasonal differences in the adults, the coloration of the male being only brighter than that of the female. The young assume the adult plumage only on the second year, or at least after they have departed from this region.

The nests and eggs were obtained after much difficulty.

I endeavored to procure the parents of some nests for certainty of identification, and not until a native suggested to me to place a slip-noose over the entrance did I succeed in catching every one I desired.

The range of this bird is strictly littoral, and includes the outlying islands near the mainland. It was observed at Saint Michaels, Yukon River mouth, Kuskokvim River mouth, and Nushagak on Bristol Bay during the breeding season.

I once observed the bird on Attu Island (the westernmost of the Aleutian Chain) on Sunday, October 8, 1880. I chased the bird up and down for two hours, but was not able to get near enough for a shot, as it was very wild. It was evidently on the fall migration, and none were seen after that day. It does not remain on the Aleutian Islands during the breeding season.

The Eskimo name of this bird is *Pshú kŭk* and refers to its note.

A comparison of this species with the European bird shows but little difference, it being only in the amount of dark on the upper breast, and the amount of gray on the head, though this varies extremely in the Alaskan specimens.

697. ANTHUS PENSILVANICUS (Lath.). *American Pipit.*

The American Pipit occurs throughout the Territory of Alaska, including the Aleutian Islands.

It is found in greatest abundance in the interior of the mainland, especially in the neighborhood of Fort Yukon. In rarely visits Saint Michael's except in the fall.

On the Aleutian Islands it prefers the higher hills. Those whose tops are bare of vegetation seem to be their favorite resort. They breed wherever found in summer. A pair collected in August, 1878, at Unalashka Island, were known to have nested on the high hills just east of the graveyard. I searched many times for the nest, but failed to find it, and then shot the birds.

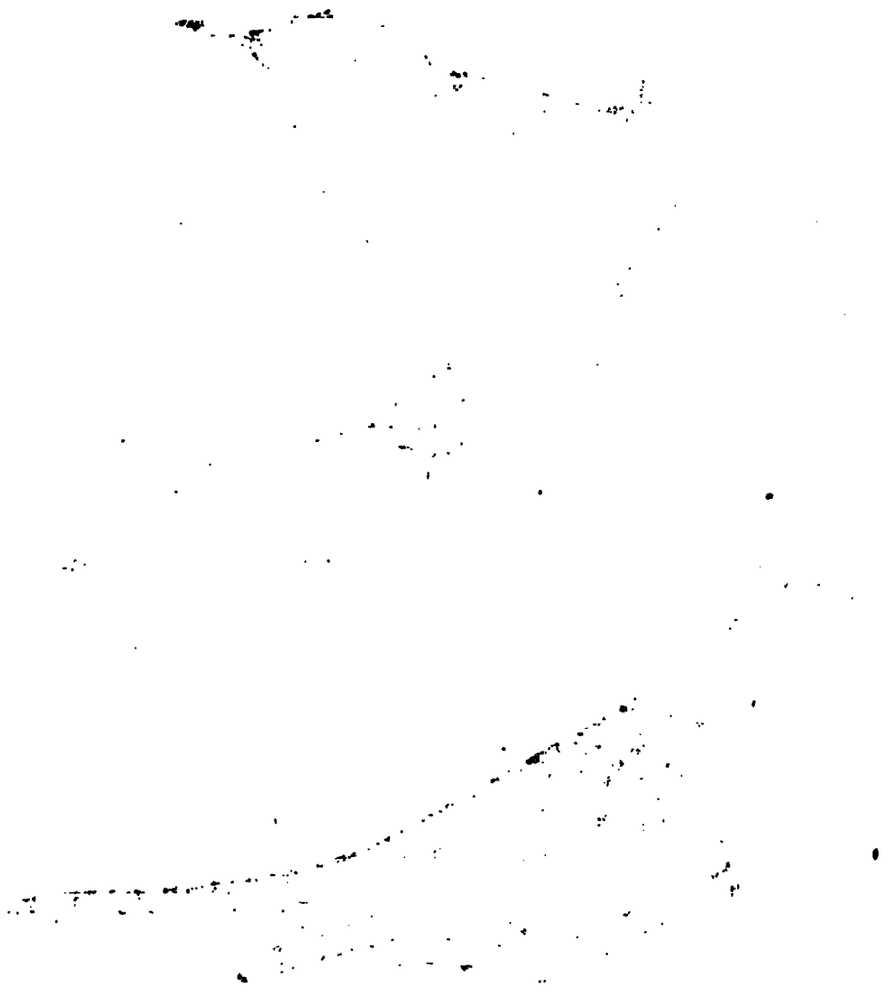
Their note is a peculiar whistling strain of a high key, and uttered only as the bird flies from one peak to another. When sitting on the ground a chirp resembling the chirp of *B. flavus* is uttered.

At Attu Island I saw this bird in the early part of September, 1880. The bird alighted for a moment on a little eminence of a high plateau at the head of Massacre Bay, on the south side of this island. Not having a gun with me I could not secure the bird. It is not at all abundant at that place, as it was the only one seen there.

At Atkha Island I saw a pair of these birds which evidently had a nest on the top of the high hills back of the head of Nazan Bay. Another individual was seen on the northwest side of the same bay. I heard it singing and scaled a steep bluff of near 800 feet high to secure the bird. It must have been disturbed by my presence, for just as I arrived at the top and stopped, to take a moment's breath, the bird took a long flight and was lost to sight and hearing.

[699.] ANTHUS CERVINUS (Pallas). *Meadow Pipit.* [See Plate IX.]

A single specimen of this bird was obtained by Messrs. Dall and Bannister at Saint Michael's.



TROGLODYTES ALA[illegible]
ANTHUS CERVIN[illegible]

Genus Pipi.

Pipi of Alaska, inhabiting the Aleutian

Islands and the coast of the mainland, especially in the neighborhood of Kadiak, exceedingly abundant. Muscles constitute the principal food of the Aleuts. On the Aleutian Islands the Aleuts have a legend to account for the existence of muscles, which seems to be the Aleutian version of the Greek story of Deucalion and Pyrrha. According to Veniaminov, 1838, the Aleuts had a tradition that their ancestors lived before the deluge in the interior of the country beyond the mountains, which rose so high that they could not be surmounted. They were obliged to build boats in order to escape the flood, and when the waters subsided they found themselves on the islands. Their boats were changed into stone, and the people into muscles.

Dall [illegible] Bay, another locality where muscles were found, [illegible] Bay, and Sitka. Portlock says that the Aleuts [illegible] muscles, for just as Lazarus [illegible] dogs [illegible] muscle shells.

Ass[illegible] (Pallas). *Pipi Pro.* [illegible] Plate [illegible] XI.]

[illegible] specimens [illegible] Alaska, by Messrs. Dall and Bannister at Saint Michaels.

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TROGLODYTES ALASCENSIS. (BAIRD). ADULT.
ANTHUS CERVINUS (PALL.) ADULT, WINTER PLUMAGE.

This with a specimen obtained in 1845 in Greenland are the only two examples of this species taken on the American shores.

The habits of the species are known only from European individuals.

It is deemed of sufficient interest to present a plate of this specimen to accompany this report.

701. CINCLUS MEXICANUS Swains. *American Dipper.*

Obtained from several localities. Number 179 was obtained at Unalashka Island, Alaska. It inhabits the rocky creeks flowing from the mountains. It is not common here. I observed it on another occasion, but failed to secure it. A permanent resident and breeds here.

The other specimens were obtained from Nulato, Alaska. At this place the bird is common, breeds here, and is a winter resident along the open streams in the neighborhood of springs which keep the water from freezing even in coldest weather.

No. 210 presents the following measurements taken from the fresh specimen, 7.5 by 10.8 by 3.4 by 2.2; iris and bill black; feet soiled-white with dark joints; claws white; ♀ ad. No. 1022 measures 7.75 by 12 by 3.8 by 2, with iris and bill black; feet soiled-white, with dark joints.

I observed this bird at Attu Island. It was in the small creek which empties in Chichagof Harbor. The bird flew a little distance, on my unexpected approach, and further search failed to drive it from its hiding place. It is said to be extremely rare at Attu, as only few of the natives knew anything about the bird.

723. TROGLODYTES ALASCENSIS Baird. *Alaskan Wren.* [See Plate IX.]

Original Nos. 6, 172, 173, 174, 175, 176, 177.

This pleasing little bird is found in abundance on all the Aleutian Chain proper. It also was observed on Unga Island, Kodiak Island, and on the mainland at Belkovsky. It never goes to the interior of even the medium-sized islands, but remains strictly along the cliffs, bluffs, and other high places forming the seasides of the islands. The lowlands in proximity to the water is also inhabited by them. The latter, together with the large bowlders lying at the water's edge, form their favorite haunts. Weed-patches near a settlement is also a favorite resort of these Wrens in the fall.

They remain on these islands during the entire year, and are as numerous in winter as in summer.

Their food consists of insects, and occasionally a few seeds will be found in their crops.

Mating occurs early in May or late in April. Nidification begins immediately. The nest is placed in a crevice in the face of a cliff or amongst the large tussocks of wild rye or other grasses The nest is large and well built; coarse grasses and roots form the foundation, and as the nest nears completion smaller grasses are selected. The interior of the nest contains few feathers of various species of birds. The walls of the nest are well carried up, and in some instances form a partial roof over the nest, leaving a hole in one side as an entrance. Five to nine eggs are laid; they are pure white in color. The young birds are able to fly in three or four weeks after hatching. I am not certain that more than one brood is hatched in a season, but young birds have been seen late as August 25th. At the approach of winter the bird becomes very familiar, and is frequently found on the window-sills searching for insects.

On one occasion I heard a gentle tapping at my back window; as I had frequently heard the same noise, I carefully drew the curtain partly aside, and saw a Wren endeavoring to obtain a fly that was inside of the pane of glass. The bird did not appear to be disturbed by my presence.

Their note is a prolonged twitter of several modulations and repeated at short intervals. When surprised, or when they come upon an object that excites their curiosity, a rapid and long rattle is sounded as an alarm, soon to be answered by a second bird. These two keep up the sound until all the Wrens within hearing assemble to investigate the cause. As many as a dozen will surround the object, and approach so close that the outstretched hand might capture them. The least motion, however, disperses them so quickly that one wonders where they have disappeared. They, at these times, hide under the stalks of the weeds or grass.

The fresh color of the bill varies from very pale to dark horn. The base of the lower mandible is always paler than any other part. The tarsi and feet are pale, with darker claws. The length of the bill is extremely variable. The iris is deepest, shining black.

735*b*. PARUS ATRICAPILLUS OCCIDENTALIS (Baird). *Oregon Chickadee.*

The Oregon Chickadee ranges through the Yukon District. During a warm period of winter these birds were occasionally seen at Saint Michael's. They retire to the interior during the month of May and are not to be seen during the summer on the coast.

They breed in the wooded districts.

Specimens were obtained from Fort Yukon, Nulato, and Saint Michael's.

This Chickadee presents several characters which may eventually permit it to be ranked as a variety peculiar to the Northwest coast. An insufficiency of specimens from intermediate localities alone prevents me from making a comparison of the present material. The evidence at hand scarcely warrants the separation of the bird as a variety.

739. PARUS CINCTUS OBTECTUS (Cab.). *Siberian Chickadee.* [See Plate X.]

Parus cinctus Auct. nec BODD. (1783).—Ridgway, Bull. Nutt. Orn. Cl., 1878, p. 37.

Parus sibiricus Auct. nec GMEL. (1788.)

?1826.—*Parus cinereus* PALL., Zoog. Russo-Asiatica. I, p. 558.

1853.—*Parus sibiricus* forma *major* MIDD. Sibir. Reise. I, p. —.

1871.—*Parus* (*Poecila*) *obtectus* CAB., Jour. f. Ornith., 1871, p. 237 (May).

1871.—*Parus grisescens* DRESSER and SHARPE, Birds of Europe, Part VI, I, p. 5 (August).

1883.—*Parus cinctus grisescens* NELSON, Cruise Corwin, p. 60.

Several specimens of *Parus* were obtained from various localities in the Yukon district. They were referred to the species *cinctus*. (See Bull. Nutt. Ornith. Club for January, 1878, p. 37.) That they should have been referred to the species *obtectus* will appear from the following comparisons:

Previous to 1878 *Parus cinctus* BODD had not been detected within our North American limits. About the same time my specimens were received at the Smithsonian Institution. A *Parus* (obtained by Mr. MacFarlane at Fort Anderson, Hudson Bay Territory, June, 1864) was discovered among the duplicates and was subsequently determined to be the same species.

A comparison of my specimens with *Parus cinctus* BODD (=*P. sibiricus* GMEL. et AUCT.), from Lapland, shows that the American specimens are not *P. cinctus*, but are undistinguishable from *P. obtectus* CAB., as I propose to show:

Parus cinctus BODD.

Culmen.	Wing.	Tail feathers.	Tarsus.	Middle toe.	Sex.	Locality.	Date.
0.45	2.65	2.65	0.63	0.38	♂ ad..	Lapland	.....
0.41	2.61	2.61	0.62	0.35	♂ ad..	....do	Mar., 1855
0.41	2.61	2.60	0.67	0.37	♀ ad..	....do	Mar., 1855
0.42	2.63	2.62	0.64	0.37			

Parus obtectus CAB.

0.38	2.65	2.65	0.68	0.40	— ad..	Nulato.....	Mar., 1875
.....	2.60	2.67	0.62	0.35	♀ ad..	Fort Anderson ...	June, 1864
0.40	2.55	2.40	0.60	0.40	— ad..	Nulato.....	Mar., 1875
0.40	2.70	2.85	0.66	0.40	♀ ad..	....do	Mar., 1875
0.41	2.70	2.80	0.65	0.40	♂ ad..	Saint Michael's ...	Feb., 1876
0.40	2.70	2.70	0.58	0.39	♂ ad..	Nulato.....	Mar., 1875
0.40	2.65	2.68	0.63	0.39			

Although the tables of measurements prove but slight relative difference between the species, the pattern of coloration will show that *P. cinctus* has the forehead, top, and back of head light grayish-brown. Back, light grayish, raw umber. Tail, plumbeous. Greater coverts edged with brownish-white; secondaries edged with grayish-white. Lores, snuff-brown. Neck, and sides of head, white. Chin and throat, sepia-brown. Breast and abdomen, white. Sides and flanks, reddish ochraceous. In some of the Lapland specimens the darker colors are much intensified, especially on back and sides.

PARUS [illegible]

R. J. L. Ridgway

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PARUS HUDSONICUS (FORST.)
PARUS CINCTUS OBTECTUS (CAB.)

Parus obtectus CAB.

Forehead, top and back of head, brownish-gray. Back, light fulvous-gray. Wings, dusky-slate Secondaries conspicuously edged with white. Tail, plumbeous-slate; outer feathers edged with paler plumbeous. Neck and sides of head, white. Chin and throat fuliginous dusky, some of the posterior feathers of the throat tipped with white. Breast and abdomen, white. A narrow, dark, fuliginous stripe runs through the eye and separates the white of the auriculars from the color of the crown.

The iris, bill, and feet, black.

Parus cinctus is an inhabitant of the northern portions of Europe and western Sibiria as far east as the Yenisei River.

Parus obtectus is found throughout the eastern portions of Siberia, and is the true Siberian form.

This species (*obtectus*) is not abundant in the known portions of the Yukon District. It is a winter resident and doubtless breeds there. A single specimen was obtained from Saint Michael's. The Chickadees visit the coast only during favorable weather in winter. I have never seen any species in the vicinity of Saint Michael's during the breeding-season.

The specimen procured by Mr. MacFarlane was a female. The nest and eggs of this individual were also secured, and are now in the collection of the Smithsonian Institution.

740. PARUS HUDSONICUS Forst. *Hudsonian Chickadee.* [See Plate X.]

A number of specimens of this Chickadee were obtained from Fort Yukon, Nulato, and several from Saint Michael's.

It visits the coast only during the winter. May 20th was the latest date obtained at Saint Michael's. This particular bird was shot while it was among a straggling clump of low willows on the edge of a high bank, forming the outline of a lake.

The iris, feet, and bill of the fresh specimen are black.

It is a constant resident of the wooded districts, and in some localities is quite abundant. It was not observed out of the Yukon District by me.

749 REGULUS CALENDULA (Linn.). *Ruby crowned Kinglet.*

Specimens of the Ruby-crowned Kinglet were obtained from Fort Yukon, where it is common, breeding there.

This bird may occur on the coast of the Yukon District, although I have not seen it.

At Nushagak, on Bristol Bay, I saw a single specimen of this bird flitting among the willow thickets which skirt the banks of that river. The date was June 28, 1878.

757. TURDUS ALICIÆ Baird. *Gray-cheeked Thrush.*

This species is not common at Saint Michael's. A pair were observed, flitting from one clump of small alders to another, just back of the Redoubt. They flew to a larger patch, where I obtained the male. The female took flight at the discharge of the gun, and was not secured.

This species breeds in this vicinity, but I failed to discover the nest and eggs.

They arrive about the first week in June. I have no date of departure. The iris and upper mandible, black; lower mandible, dark anteriorly and lighter at base, drying very pale. Feet dark, with paler soles. Gape yellow.

This species has not yet been detected on the Aleutian Islands.

758*a*. TURDUS USTULATUS SWAINSONI (Cab.). *Olive-backed Thrush.*

A single specimen of this species was obtained from Fort Yukon, Alaska.

It is apparently not common in any locality and probably does not visit the coast of the Yukon District.

761. MERULA MIGRATORIA (Linn.). *American Robin.*

The specimens of the Robin collected by me were obtained from Fort Yukon, where it is quite common and breeds.

It arrives there during the latter twenty days of May and remains until the sharp frosts of September. I obtained no specimens from other parts of the Yukon District.

I was at Nushagak, near the river of that name emptying into Bristol Bay, in June, 1878, where I had a few hours' hunting. About two miles back of the village the timber begins. It is a scanty growth of spruce, many of the trees isolated. Along the streams heavy growths of alder form extensive thickets. On approaching one of these clumps I heard a twittering of an unknown bird. I crept up stealthily, but the bird darted to the other side of the thicket. After repeated trials to get within shooting distance, and following it over two miles, I fired at long range and failed to get the bird. What it was I have no knowledge. It looked like a Robin, but much more active, and of deeper color. The song, which was uttered incessantly when not on the wing, did not at all resemble that of the Robin.

The Robin has not been detected on the Aleutian Islands, although it is reported to be seen as a chance visitor during the migratory season at the Pribylof Islands.

763. HESPEROCICHLA NÆVIA (Gmel.). *Varied Thrush.*

One specimen was obtained at Fort Yukon, Alaska, September 4, 1876. It is not plentiful at any time. A second specimen was brought to me at Saint Michael's on May 27, 1877, killed by a native, just back of the Redoubt, among the patches of alder. It was far advanced in decompo sition when I saw it, and found it impossible to even save the wings and other parts for identification, else than on the spot.

It is only a casual visitor to the coast, and apparently not abundant anywhere in the Yukon District.

This species was not detected on any of the Aleutian Islands.

LIST OF THE BIRDS OF ALASKA.

The following list contains all the authentically known and recognized species of Alaskan birds. A full investigation of the natural history of the Territory will, doubtless, add many names of birds which have not yet been detected within its border and included waters.

The nomenclature here adopted is that of the A. O. U. Check-list of North American Birds, 1886. The numbers preceding each species or subspecies correspond with the numbers in that Check-list.

FAMILY PODICIPIDÆ. GREBES.

Genus COLYMBUS Linnæus.

2. COLYMBUS HOLBŒLLI (Reinh.) *Holbœll's Grebe.*
3. COLYMBUS AURITUS Linn. *Horned Grebe.*

FAMILY URINATORIDÆ. LOONS.

Genus URINATOR Cuvier.

7. URINATOR IMBER (Gunn.). *Loon.*
8. URINATOR ADAMSII (Gray). *Yellow-billed Loon.*
9. URINATOR ARCTICUS (Linn.). *Black-throated Loon.*
10. URINATOR PACIFICUS (Lawr.). *Pacific Loon.*
11. URINATOR LUMME (Gunn.). *Red-throated Loon.*

FAMILY ALCIDÆ. AUKS, MURRES, AND PUFFINS.

Genus LUNDA Pallas.

12. LUNDA CIRRHATA Pall. *Tufted Puffin.*

Genus FRATERCULA Brisson.

14. FRATERCULA CORNICULATA (Naum.). *Horned Puffin.*

Genus CERORHINCA Bonaparte.

15. CERORHINCA MONOCERATA (Pall.). *Rhinoceros Auklet.*

Genus PTYCHORAMPHUS Brandt.

16. PTYCHORAMPHUS ALEUTICUS (Pall.). *Cassin's Auklet.*

Genus CYCLORRHYNCHUS Kaup.

17. CYCLORRHYNCHUS PSITTACULUS (Pall.). *Paroquet Auklet.*

Genus SIMORHYNCHUS Merrem.

18. SIMORHYNCHUS CRISTATELLUS (Pall.). *Crested Auklet.*
19. SIMORHYNCHUS PYGMÆUS (Gmel.). *Whiskered Auklet.*
20. SIMORHYNCHUS PUSILLUS (Pall.). *Least Auklet.*

Genus SYNTHLIBORHAMPHUS Brandt.

21. SYNTHLIBORAMPHUS ANTIQUUS (Gmel.). *Ancient Murrelet.*
22. SYNTHLIBORAMPHUS WUMIZUSUME (Temm.). *Temminck's Murrelet.*

Genus BRACHYRHAMPHUS Brandt.

23. BRACHYRAMPHUS MARMORATUS (Gmel.). *Marbled Murrelet.*
24. BRACHYRAMPHUS KITTLITZII Brandt. *Kittlitz's Murrelet.*

Genus CEPPHUS Pallas.

28. CEPPHUS MANDTII (Licht.). *Mandt's Guillemot.*
29. CEPPHUS COLUMBA Pall. *Pigeon Guillemot.*

Genus URIA Brisson.

30*a*. URIA TROILE CALIFORNICA (Bryant). *California Murre.*
31. URIA LOMVIA ARRA (Pall.). *Pallas's Murre.*

FAMILY STERCORARIIDÆ. SKUAS AND JÆGERS.

Genus STERCORARIUS Brisson.

36. STERCORARIUS POMARINUS (Temm.). *Pomarine Jæger.*
37. STERCORARIUS PARASITICUS (Linn.). *Parasitic Jæger.*
38. STERCORARIUS LONGICAUDUS (Vieill.). *Long-tailed Jæger.*

FAMILY LARIDÆ. GULLS AND TERNS.

Genus GAVIA Boie.

39. GAVIA ALBA (Gunn.). *Ivory Gull.*

Genus RISSA Stephens.

40*a*. RISSA TRIDACTYLA POLLICARIS Ridgw. *Pacific Kittiwake.*
41. RISSA BREVIROSTRIS (Bruch). *Red-legged Kittiwake.*

Genus LARUS Linnæus.

42*i*. LARUS BARROVIANNUS Ridgw. *Western Glaucous Gull.*
44. LARUS GLAUCESCENS Naum. *Glaucous-winged Gull.*
46. LARUS NELSONI Hensh. *Nelson's Gull.*

48. LARUS SCHISTISAGUS Stejn. *Slaty-backed Gull.*
52. LARUS CACHINNANS Pall. *Pallas's Gull.*
53. LARUS CALIFORNICUS Lawr. *California Gull.*
55. LARUS BRACHYRHYNCHUS Rich. *Short-billed Gull.*
60. LARUS PHILADELPHIA (Ord). *Bonaparte's Gull*

Genus RHODOSTETHIA Maggillivray.

61. RHODOSTETHIA ROSEA (Maggil.). *Ross's Gull.*

Genus XEMA Leach.

62. XEMA SABINII (Sab.). *Sabine's Gull.*

Genus STERNA Linnæus.

71. STERNA PARADISÆA Brünn. *Arctic Tern.*
73. STERNA ALEUTICA Baird. *Aleutian Tern.*

Genus HYDROCHELIDON Boie.

77. HYDROCHELIDON NIGRA SURINAMENSIS (Gmel.). *Black Tern.*

FAMILY DIOMEDEIDÆ. ALBATROSSES.

Genus DIOMEDEA Linnæus.

81. DIOMEDEA NIGRIPES Aud. *Black-footed Albatross.*
82. DIOMEDEA ALBATRUS Pall. *Short-tailed Albatross.*

FAMILY PROCELLARIIDÆ. FULMARS AND SHEARWATERS.

Genus FULMARUS Stephens.

86*b*. FULMARUS GLACIALIS GLUPISCHA Stejn. *Pacific Fulmar.*
86*c*. FULMARUS GLACIALIS RODGERSII (Cass.). *Rodgers's Fulmar.*

Genus PUFFINUS Brisson.

96. PUFFINUS TENUIROSTRIS (Temm.). *Slender-billed Shearwater.*

Genus ÆSTRELATA Bonaparte.

100. ÆSTRELATA FISHERI Ridgw. *Fisher's Petrel.*

Genus OCEANODROMA Reichenbach.

105. OCEANODROMA FURCATA (Gmel.). *Fork-tailed Petrel.*
105.1. OCEANODROMA HORNBY (Gray). *Hornby's Petrel.*
106. OCEANODROMA LEUCORHOA (Vieill.). *Leach's Petrel.*

FAMILY PHALACROCORACIDÆ. CORMORANTS.

Genus PHALACROCORAX Brisson.

120*b*. PHALACROCORAX DILOPHUS CINCINATUS (Brandt). *White-crested Cormorant.*
123. PHALACROCORAX PELAGICUS Pall. *Pelagic Cormorant.*
123*a*. PHALACROCORAX PELAGICUS ROBUSTUS Ridgw. *Violet-green Cormorant.*
124. PHALACROCORAX URILE (Gmel.). *Red-faced Cormorant.*
(?) PHALACROCORAX PERSPICILLATUS Pall. *Pallas's Cormorant.*

FAMILY ANATIDÆ. DUCKS, GEESE, AND SWANS.

Genus MERGANSER Brisson.

129. MERGANSER AMERICANUS (Cass.). *American Merganser.*
130. MERGANSER SERRATOR (Linn.). *Red breasted Merganser.*

Genus LOPHODYTES Reichenbach.

131. LOPHODYTES CUCULLATUS (Linn.). *Hooded Merganser.*

Genus ANAS Linnæus.

132. ANAS BOSCHAS Linn. *Mallard.*
135. ANAS STREPERA Linn. *Gadwall.*
136. ANAS PENELOPE Linn. *Widgeon.*
137. ANAS AMERICANA Gmel. *Baldpate.*
[138.] ANAS CRECCA Linn. *European Teal.*
139. ANAS CAROLINENSIS Gmelin. *Green-winged Teal.*
140. ANAS DISCORS Linn. *Blue-winged Teal.*

Genus SPATULA Boie.

142. SPATULA CLYPEATA (Linn.). *Shoveler.*

Genus DAFILA Stephens.

143. DAFILA ACUTA (Linn.). *Pintail.*

Genus AYTHYA Boie.

146. AYTHYA AMERICANA (Eyt.). *Redhead.*
147. AYTHYA VALLISNERIA (Wils.). *Canvas-back.*
148. AYTHYA MARILA NEARCTICA Stejn. *American Scaup Duck.*
149. AYTHYA AFFINIS (Eyt.). *Lesser Scaup Duck.*
150. AYTHYA COLLARIS (Donov.). *Ring-necked Duck.*

Genus GLAUCEONETTA Stejneger.

151. GLAUCIONETTA CLANGULA AMERICANA (Bonap.). *American Golden-eye.*
152. GLAUCIONETTA ISLANDICA (Gmel.). *Barrow's Golden-eye.*

Genus CHARITONETTA Stejneger.

153. CHARITONETTA ALBEOLA (Linn.). *Buffle-head.*

Genus CLANGULA Leach.

154. CLANGULA HYEMALIS (Linn.). *Old-squaw.*

Genus HISTRIONICUS Lesson.

155. HISTRIONICUS HISTRIONICUS (Linn.). *Harlequin Duck.*

Genus ENICONETTA Gray.

157. ENICONETTA STELLERI (Pall.). *Steller's Duck.*

Genus ARCTONETTA Gray.

158. ARCTONETTA FISCHERI (Brandt). *Spectacled Eider.*

Genus SOMATERIA Leach.

161. SOMATERIA V-NIGRA Gray. *Pacific Eider.*
162. SOMATERIA SPECTABILIS (Linn.). *King Eider.*

Genus OIDEMIA Fleming.

163. OIDEMIA AMERICANA Sw. & Rich. *American Scoter.*
165. OIDEMIA DEGLANDI Bonap. *White-winged Scoter.*
166. OIDEMIA PERSPICILLATA (Linn.). *Surf Scoter.*

Genus CHEN Boie.

169. CHEN HYPERBOREA (Pall.). *Lesser Snow Goose.*
170. CHEN ROSSII (Baird). *Ross's Snow Goose.*

Genus ANSER Brisson.

171*a*. ANSER ALBIFRONS GAMBELI (Hartl.). *American White-fronted Goose.*

Genus BRANTA Scopoli.

172. BRANTA CANADENSIS (Linn.). *Canada Goose.*
172*a*. BRANTA CANADENSIS HUTCHINSII (Sw. and Rich.). *Hutchins's Goose.*
172*b*. BRANTA CANADENSIS OCCIDENTALIS (Baird). *White-cheeked Goose.*
172*c*. BRANTA CANADENSIS MINIMA Ridgw. *Cackling Goose.*
174. BRANTA NIGRICANS (Lawr.). *Black Brant.*

Genus PHILACTE Bannister.

176. PHILACTE CANAGICA (Sevast.). *Emperor Goose.*

Genus OLOR Wagler.

180. OLOR COLUMBIANUS (Ord). *Whistling Swan.*
181. OLOR BUCCINATOR (Rich.). *Trumpeter Swan.*

FAMILY ARDEIDÆ. HERONS, BITTERNS, ETC.

Genus ARDEA Linn.

194. ARDEA HERODIAS Linn. *Great Blue Heron.*

FAMILY GRUIDÆ. CRANES.

Genus GRUS Pallas.

205. GRUS CANADENSIS (Linn.). *Little Brown Crane.*

FAMILY RALLIDÆ. RAILS, GALLINULES, AND COOTS.

Genus FULICA Linnæus.

221. FULICA AMERICANA Gmel. *American Coot.*

FAMILY PHALAROPODIDÆ. PHALAROPES.

Genus CRYMOPHILUS Vieillot.

122. CRYMOPHILUS FULICARIUS (Linn.). *Red Phalarope.*

Genus PHALAROPUS Brisson.

223. PHALAROPUS LOBATUS (Linn.). *Northern Phalarope.*

FAMILY SCOLOPACIDÆ. SNIPES, SANDPIPERS, ETC.

Genus GALLINAGO Leach.

230. GALLINAGO DELICATA (Ord). *Wilson's Snipe.*

Genus MACRORHAMPHUS Leach.

231. MACRORHAMPHUS GRISEUS (Gmel.). *Dowitcher.*
232. MACRORHAMPHUS SCOLOPACEUS (Say). *Long-billed Dowitcher.*

Genus TRINGA Linnæus.

234. TRINGA CANUTUS Linn. *Knot.*
235. TRINGA MARITIMA Brünn. *Purple Sandpiper.*
236. TRINGA COUESI (Ridgw.). *Aleutian Sandpiper.*
237. TRINGA PTILOCNEMIS Coues. *Prybilof Sandpiper.*
238. TRINGA ACUMINATA (Horsf.). *Sharp-tailed Sandpiper.*
239. TRINGA MACULATA Vieill. *Pectoral Sandpiper.*
240. TRINGA FUSCICOLLIS Vieill. *White-rumped Sandpiper.*
241. TRINGA BAIRDII Coues. *Baird's Sandpiper.*
242. TRINGA MINUTILLA Vieill. *Least Sandpiper.*
242.1. TRINGA DAMACENSIS (Horsf.). *Long-toed Stint.*
243*a*. TRINGA ALPINA PACIFICA (Coues). *Red backed Sandpiper.*
244. TRINGA FERRUGINEA Brünn. *Curlew Sandpiper.*

Genus EURYNORHYNCHUS Nilsson.

[245.] EURYNORHYNCHUS PYGMÆUS Linn. *Spoon-bill Sandpiper.*

Genus EREUNETES Illiger.

246. EREUNETES PUSILLUS (Linn.). *Semipalmated Sandpiper.*
247. EREUNETES OCCIDENTALIS Lawr. *Western Sandpiper.*

Genus CALIDRIS Cuvier.

248. CALIDRIS ARENARIA (Linn.). *Sanderling.*

Genus LIMOSA Brisson.

249. LIMOSA FEDOA (Linn.). *Marbled Godwit.*
250. LIMOSA LAPPONICA BAUERI (Naum.). *Pacific Godwit.*
251. LIMOSA HÆMASTICA (Linn.). *Hudsonian Godwit.*

Genus ROTANUS Bechstein.

254. TOTANUS MELANOLEUCUS (Gmel.). *Greater Yellow-legs.*
255. TOTANUS FLAVIPES (Gmel.). *Yellow-legs.*
256. TOTANUS SOLITARIUS (Wils.). *Solitary Sandpiper.*

Genus HETERACTITIS Stejneger.

259. HETERACTITIS INCANUS (Gmel.). *Wandering Tattler.*

Genus BARTRAMIA Lesson.

261. BARTRAMIA LONGICAUDA (Bechst.). *Bartramian Sandpiper.*

Genus TRYNGITES Cabanis.

262. TRYNGITES SUBRUFICOLLIS (Vieill.). *Buff-breasted Sandpiper.*

Genus ACTITIS Illiger.

263. ACTITIS MACULARIA (Linn.). *Spotted Sandpiper.*

Genus NUMENIUS Brisson.

264. NUMENIUS LONGIROSTRIS Wils. *Long-billed Curlew.*
265. NUMENIUS HUDSONICUS Lath. *Hudsonian Curlew.*
266. NUMENIUS BOREALIS (Forst.). *Eskimo Curlew.*
[268.] NUMENIUS TAHITIENSIS (Gmel.). *Bristle-thighed Curlew.*

FAMILY CHARADRIIDÆ. PLOVERS.

Genus VANELLUS Brisson.

[269.] VANELLUS VANELLUS (Linn.). *Lapwing.*

Genus CHARADRIUS Linnæus.

270. CHARADRIUS SQUATAROLA (Linn.). *Black-bellied Plover.*
272. CHARADRIUS DOMINICUS (Müll.). *American Golden Plover.*
272*a*. CHARADRIUS DOMINICUS FULVUS (Gmel.). *Pacific Golden Plover.*

Genus ÆGIALITIS Boie.

274. *ÆGIALITIS SEMIPALMATA (Bonap.). *Semipalmated Plover.*
[276.] ÆGIALITIS DUBIA (Scop.). *Little Ring Plover.*
[279.] ÆGIALITIS MONGOLA (Pall.). *Mongolian Plover.*

FAMILY APHRIZIDÆ. SURF BIRDS AND TURNSTONES.

Genus APHRIZA Audubon.

282. APHRIZA VIRGATA (Gmel.). *Surf Bird.*

Genus ARENARIA Brisson.

283. ARENARIA INTERPRES (Linn.). *Turnstone.*
284. ARENARIA MELANOCEPHALA (Vig.). *Black Turnstone.*

FAMILY HÆMATOPODIDÆ. OYSTER-CATCHERS.

Genus HÆMATOPUS Linnæus.

287. HÆMATOPUS BACHMANI Aud. *Black Oyster-catcher.*

FAMILY TETRAONIDÆ. GROUSE, PARTRIDGES, ETC.

Genus DENDRAGAPUS Elliott.

297*a*. DENDRAGAPUS OBSCURUS FULIGINOSUS Ridgw. *Sooty Grouse.*
298. DENDRAGAPUS CANADENSIS (Linn.). *Canada Grouse.*

Genus BONASA Stephens.

300*b*. BONASA UMBELLUS UMBELLOIDES (Dougl.). *Gray Ruffed Grouse.*

*See Coues, Birds N. W., p. 455; and Finsch Abh. Nat. III, 1872, 62, Alaska. It is quite probable that the species referred to should be *Æ. semipalmata;* and especially as this species abounds in that region, while *circumcincta* is an eastern bird.

Genus LAGOPUS Brisson.

301. LAGOPUS LAGOPUS (Linn.). *Willow Ptarmigan.*
302. LAGOPUS RUPESTRIS (Gmel.). *Rock Ptarmigan.*
302*b*. LAGOPUS RUPESTRIS NELSONI Stejn. *Nelson's Ptarmigan.*
302*c*. LAGOPUS RUPESTRIS ATKHENSIS (Turner). *Turner's Ptarmigan.*

Genus PEDIOCETES Baird.

308. PEDIOCETES PHASIANELLUS (Linn.). *Sharp-tailed Grouse.*

FAMILY FALCONIDÆ. VULTURES, FALCONS, HAWKS, EAGLES, ETC.

Genus CIRCUS Lacépède.

331. CIRCUS HUDSONIUS (Linn.). *Marsh Hawk.*

Genus ACCIPITER Brisson.

332. ACCIPITER VELOX (Wils.). *Sharp-shinned Hawk.*
334. ACCIPITER ATRICAPILLUS (Wils.). *American Goshawk.*
334*a*. ACCIPITER ATRICAPILLUS STRIATULUS Ridgw. *Western Goshawk.*

Genus BUTEO Cuvier.

337*b*. BUTEO BOREALIS CALURUS (Cass.). *Western Red-tail.*
342. BUTEO SWAINSONI Bonap. *Swainson's Hawk.*

Genus ARCHIBUTEO Brehm.

[347.] ARCHIBUTEO LAGOPUS (Brünn.). *Rough-legged Hawk.*
347*a*. ARCHIBUTEO LAGOPUS SANCTI-JOHANNIS (Gmel.). *American Rough-legged Hawk.*

Genus AQUILA Brisson.

349. AQUILA CHRYSAËTOS (Linn.). *Golden Eagle.*

Genus HALIÆTUS Savigny.

352. HALIÆTUS LEUCOCEPHALUS (Linn.). *Bald Eagle.*

Genus FALCO Linnæus.

353. FALCO ISLANDUS (Brünn.). *White Gyrfalcon.*
354. FALCO RUSTICOLUS (Linn.). *Gray Gyrfalcon.*
354*a*. FALCO RUSTICOLUS GYRFALCO (Linn.). *Gyrfalcon.*
356. FALCO PEREGRINUS ANATUM (Bonap.). *Duck Hawk.*
356*a*. FALCO PEREGRINUS PEALEI Ridgw. *Peale's Falcon.*
357. FALCO COLUMBARIUS Linn.. *Pigeon Hawk.*
357*a*. FALCO COLUMBARIUS SUCKLEYI Ridgw. *Black Merlin.*
360. FALCO SPARVERIUS Linn. *American Sparrow Hawk.*

Genus PANDION Savigny.

364. PANDION HALIAËTUS CAROLINENSIS (Gmel.). *American Osprey.*

FAMILY BUBONIDÆ. HORNED OWLS, ETC.

Genus ASIO Brisson.

367. ASIO ACCIPITRINUS (Pall.). *Short-eared Owl.*

Genus ULULA Cuvier.

270. ULULA CINEREA (Gmel.). *Great Gray Owl.*
[370*a*.] ULULA CINEREA LAPPONICA (Retz.). *Lapp Owl.*

Genus NYCTALA Brehm.

371. NYCTALA TENGMALMI RICHARDSONI (Bonap.). *Richardson's Owl.*

Genus MEGASCOPS Kaup.

373*d*. MEGASCOPS ASIO KENNICOTTII (Elliott). *Kennicott's Screech Owl.*

Genus BUBO Cuvier.

375*b*. BUBO VIRGINIANUS ARCTICUS (Swains.). *Arctic Horned Owl.*
375*c*. BUBO VIRGINIANUS SATURATUS Ridgw. *Dusky Horned Owl.*

Genus NYCTEA Stephens.

376. NYCTEA NYCTEA (Linn.). *Snowy Owl.*

Genus SURNIA Duméril.

[377.] SURNIA ULULA (Linn.). *Hawk Owl.*
377*a*. SURNIA ULULA CAPAROCH (Müll.). *American Hawk Owl.*

FAMILY ALCEDINIDÆ. KINGFISHERS.

Genus CERYLE Boie.

390 CERYLE ALCYON (Linn.). *Belted Kingfisher.*

FAMILY PICIDÆ. WOODPECKERS.

Genus DRYOBATES Boie.

393*a*. DRYOBATES VILLOSUS LEUCOMELAS (Bodd.). *Northern Hairy Woodpecker.*
394. DRYOBATES PUBESCENS (Linn.). *Downy Woodpecker.*

Genus PICOIDES Lacépède.

401. PICOIDES AMERICANUS Brehm. *American Three-toed Woodpecker.*
401*a*. PICOIDES AMERICANUS ALASCENSIS (Nels.). *Alaskan Three-toed Woodpecker.*
401*b*. PICOIDES AMERICANUS DORSALIS Baird. *Alpine Three-toed Woodpecker.*

Genus COLAPTES Swainson.

412. COLAPTES AURATUS (Linn.). *Flicker.*
413*a*. COLAPTES CAFER SATURATIOR Ridgw. *Northwestern Flicker.*

FAMILY TROCHILIDÆ. HUMMINGBIRDS.

Genus TROCHILUS Linnæus.

433. TROCHILUS RUFUS Gmel. *Rufous Hummingbird.*

FAMILY TYRANNIDÆ. TYRANT FLYCATCHERS.

Genus SAYORNIS Bonaparte.

457. SAYORNIS SAYA (Bonap.). *Say's Phœbe.*

Genus EMPIDONAX Cabanis.

464. EMPIDONAX DIFFICILIS Baird. *Baird's Flycatcher.*
466. EMPIDONAX PUSILLUS (Swains.). *Little Flycatcher.*

FAMILY ALAUDIDÆ. LARKS.

Genus OTOCORIS Linnæus.

474*a*. OTOCORIS ALPESTRIS LEUCOLÆMA (Coues). *Pallid Horned Lark.*

FAMILY CORVIDÆ. CROWS, MAGPIES, JAYS, ETC.

Genus PICA Brisson.

475. PICA PICA HUDSONICA (Sab.).

Genus CYANOCITTA Strickland.

478. CYANOCITTA STELLERI (Gmel.). *Steller's Jay.*

Genus PERISOREUS Bonaparte.

484*b*. PERISOREUS CANADENSIS FUMIFRONS Ridgw. *Alaskan Jay.*

Genus CORVUS Linnæus.

486. CORVUS CORAX SINUATUS (Wagl.). *American Raven.*
489. CORVUS CAURINUS Baird. *Northwest Crow.*

Genus PICICORVUS Bonaparte.

491. PICICORVUS COLUMBIANUS (Wils.). *Clarke's Nutcracker.*

FAMILY STURNIDÆ. STARLINGS.

Genus SCOLECOPHAGUS Swainson.

509. SCOLECOPHAGUS CAROLINUS (Müll.). *Rusty Blackbird.*

FAMILY FRINGILLIDÆ. FINCHES, SPARROWS, ETC.

Genus PINICOLA Vieillot.

515. PINICOLA ENUCLEATOR (Linn.). *Pine Grosbeak.*

Genus PYRRHULA Brisson.

[516.] PYRRHULA CASSINI (Baird). *Cassin's Bullfinch.*

Genus LOXIA Linnæus.

521. LOXIA CURVIROSTRA MINOR (Brehm). *American Crossbill.*
522. LOXIA LEUCOPTERA (Gmel.). *White-winged Crossbill.*

Genus LEUCOSTICTE Swainson.

523. LEUCOSTICTE GRISEONUCHA (Brandt). *Aleutian Leucosticte.*
524*a*. LEUCOSTICTE TEPHROCOTIS LITTORALIS (Baird). *Hepburn's Leucosticte.*

Genus ACANTHIS Bechstein.

527*a*. ACANTHIS HORNEMANNII EXILIPES (Coues). *Hoary Redpoll.*
528. ACANTHIS LINARIA (Linn.). *Redpoll.*
528*a*. ACANTHIS LINARIA HOLBŒLLII (Brehm). *Holbœll's Redpoll.*

Genus PLECTROPHENAX Stejneger.

534. PLECTROPHENAX NIVALIS (Linn.). *Snowflake.*
534*a*. PLECTROPHENAX NIVALIS TOWNSENDI Ridgw. *Townsend's Snowflake.*
535. PLECTROPHENAX HYPERBOREUS Ridgw. *McKay's Snowflake.*

Genus CALCARIUS Bechstein.

536. CALCARIUS LAPPONICUS (Linn.). *Lapland Longspur.*
537. CALCARIUS PICTUS (Swains.). *Smith's Longspur.*

Genus AMMODRAMUS Swainson.

542. AMMODRAMUS SANDWICHENSIS (Gmel.). *Sandwich Sparrow.*
542*b*. AMMODRAMUS SANDWICHENSIS ALAUDINUS (Bonap.). *Western Savanna Sparrow.*

Genus ZONOTRICHIA Swainson.

555. ZONOTRICHIA INTERMEDIA Ridgw. *Intermediate Sparrow.*
557. ZONOTRICHIA CORONATA (Pall.). *Golden-crowned Sparrow.*

Genus SPIZELLA Bonaparte.

559*a*. SPIZELLA MONTICOLA OCHRACEA Brewst. *Western Tree Sparrow.*
560. SPIZELLA SOCIALIS (Wils.). *Chipping Sparrow.*

Genus JUNCO Wagler.

567. JUNCO HYEMALIS (Linn.). *Slate-colored Junco.*
567*a*. JUNCO HYEMALIS OREGONUS (Towns.). *Oregon Junco.*

Genus MELOSPIZA Baird.

581*f*. MELOSPIZA FASCIATA RUFINA (Bonap.). *Sooty Song Sparrow.*
582. MELOSPIZA CINEREA (Gmel.). *Aleutian Song Sparrow.*
583. MELOSPIZA LINCOLNI (Aud.). *Lincoln's Sparrow.*

Genus PASSERELLA Swainson.

585. PASSERELLA ILIACA (Merr.). *Fox Sparrow.*
585*a*. PASSERELLA ILIACA UNALASCHCENSIS (Gmel.). *Townsend's Sparrow.*

FAMILY HIRUNDINIDÆ. SWALLOWS.

Genus PETROCHELIDON Cabanis.

612. PETROCHELIDON LUNIFRONS (Say.). *Cliff Swallow.*

Genus CHELIDON Forster.

613. CHELIDON ERYTHROGASTER (Bodd.). *Barn Swallow.*

Genus TACHYCINETA Cabanis.

614. TACHYCINETA BICOLOR (Vieill.). *Tree Sparrow.*

Genus CLIVICOLA Forster.

616. CLIVICOLA RIPARIA (Linn.). *Bank Swallow.*

FAMILY AMPELIDÆ. WAXWINGS, ETC.

Genus AMPELIS Linnæus.

618. AMPELIS GARRULUS Linn. *Bohemian Waxwing.*

FAMILY LANIIDÆ SHRIKES.

Genus LANIUS Linnæus.

621. LANIUS BOREALIS Vieill. *Northern Shrike.*

FAMILY MNIOTILTIDÆ. WOOD-WARBLERS.

Genus HELMINTHOPHILA Ridgway.

646. HELMINTHOPHILA CELATA (Say). *Orange-crowned Warbler.*
646*a*. HELMINTHOPHILA CELATA LUTESCENS (Ridgw.). *Lutescent Warbler.*

Genus DENDROICA Gray.

652. DENDROICA ÆSTIVA (Gmel.). *Yellow Warbler.*
655. DENDROICA CORONATA (Linn.). *Myrtle Warbler.*
661. DENDROICA STRIATA (Forst.). *Black-poll Warbler.*
668. DENDROICA TOWNSENDI (Nutt.). *Townsend's Warbler.*

Genus SEIURUS Swainson.

674. SEIURUS AUROCAPILLUS (Linn.). *Oven-bird.*
675*a*. SEIURUS NOVEBORACENSIS NOTABILIS (Grinn.). *Grinnell's Water-thrush.*

Genus SYLVANIA Nuttall.

685. SYLVANIA PUSILLA (Wils.). *Wilson's Warbler.*
685*a*. SYLVANIA PUSILLA PILEOLATA (Pall.). *Pileolated Warbler.*

FAMILY MOTACILLIDÆ. WAGTAILS.

Genus MOTACILLA Linnæus.

[695]. MOTACILLA OCULARIS Swinh. *Swinhoe's Wagtail.*

Genus BUDYTES Cuvier.

697. BUDYTES FLAVUS LEUCOSTRIATUS (Hom.). *Siberian Yellow Wagtail.*

Genus ANTHUS Bechstein.

697. ANTHUS PENSILVANICUS (Lath.). *American Pipit.*
[699.] ANTHUS CERVINUS (Pallas). *Red-throated Pipit.*

Family CINCLIDÆ. DIPPERS.

Genus CINCLUS Bechstein.

701. CINCLUS MEXICANUS Swains. *American Dipper.*

FAMILY TROGLODYTIDÆ. WRENS, THRASHERS, ETC.

Genus TROGLODYTES Vieillot.

722*a*. TROGLODYTES HIEMALIS PACIFICUS Baird. *Western Winter Wren.*
723. TROGLODYTES ALASCENSIS Baird. *Alaskan Wren.*

FAMILY CERTHIIDÆ. CREEPERS.

Genus CERTHIA Linnæus.

726. CERTHIA FAMILIARIS AMERICANA (Bonap.). *Brown Creeper.*

FAMILY PARIDÆ. NUTHATCHES AND TITS.

Genus PARUS Linnæus.

735*a*. PARUS ARTICAPILLUS SEPTENTRIONALIS (Harris). *Long-tailed Chickadee.*
735*b*. PARUS ATRICAPILLUS OCCIDENTALIS (Baird). *Oregon Chickadee.*
739. PARUS CINCTUS OBTECTUS (Cab.). *Siberian Chickadee.*
740. PARUS HUDSONICUS Forst. *Hudsonian Chickadee.*
741. PARUS RUFESCENS Towns. *Chestnut-backed Chickadee.*

FAMILY SYLVIIDÆ. WARBLERS, KINGLETS, ETC.

Genus PHYLLOPSEUSTES Meyer.

747. PHYLLOPSEUSTES BOREALIS (Blas.). *Kennicott's Willow Warbler.*

Genus REGULUS Cuvier.

748. REGULUS SATRAPA Licht. *Golden-crowned Kinglet.*
748*a*. REGULUS SATRAPA OLIVACEUS Baird. *Western Golden-crowned Kinglet.*
749. REGULUS CALENDULA (Linn.). *Ruby-crowned Kinglet.*

FAMILY TURDIDÆ. THRUSHES, ETC.

Genus TURDUS Linnæus.

757. TURDUS ALICIÆ Baird. *Gray-cheeked Thrush.*
758. TURDUS USTULATUS (Nutt.). *Russet-backed Thrush.*
759. TURDUS AONALASCHKÆ Gmel. *Dwarf Hermit Thrush.*

Genus MERULA Leach.

761. MERULA MIGRATORIA (Linn.). *American Robin.*

Genus HESPEROCICHLA Baird.

763. HESPEROCICHLA NÆVIA (Gmel.). *Varied Thrush.*

Genus CYANECULA Brehm.

[764.] CYANECULA SUECICA (Linn.). *Red-spotted Bluethroat.*

Genus SAXICOLA Bechstein.

765. SAXICOLA ŒNANTHE (Linn.). *Wheatear.*

PART VI.—MAMMALS.

ORDER CETACEA. CETACEANS.

FAMILY DELPHINIDÆ. THE DOLPHINS.

Genus DELPHINUS.

DELPHINUS BAIRDII Dall. *Baird's Dolphin.*

Genus LEUCORHAMPHUS.

LEUCORHAMPHUS BOREALIS (Peale) Gill. *Right-whale Porpoise.*

Genus LAGENORHYNCHUS.

LAGENORHYNCHUS OBLIQUIDENS Gill. *Striped Dolphin.*

While returning from Attu Island to Unalashka I observed, in the vicinity of Amchi'tka Island quite a number of Dolphins sporting about the vessel, as she was speeding at a lively rate over the water. These creatures were only about eight or nine feet in length and had numerous markings, stripes or bars, along the sides and throat. These markings were two or three inches wide and of a sulphur-yellow color, while the back and sides were bluish-black.

Two or three persons on the vessel declared they had seen the same species in the waters of the Japan coast, and gave the name Japan Dolphins to those seen near Amchi'tka. I do not know to what species they should be referred. They do not, however, occur about the eastern Aleutian Islands.

The Aleuts give the name *A ga mákh chikh* to a species of striped, or barred, Dolphin; but to which species the name should be referred I was not able to determine satisfactorily to myself.

Genus ORCA.

ORCA ATRA Cope. *Pacific Killer.*

The "Killer" Whale is very abundant in the waters of the Aleutian Islands and the Pribylof Group, occurring less plentifully in the more northern portions of Bering Sea.

At Saint Michael's I have but once seen them in the small bay; this instance occurring when the surface of the water was covered with ice, the only break being a place of several hundred feet in length and only a few rods wide. They had come from the sea and appeared in this opening. They remained several hours and apparently disliked to dive again under the strip of ice, over half a mile in width, between the break and the open sea. Many of the natives saw these creatures, but would not attempt their capture, asserting that the "Killers" would cut their canoes in two with their fins and then swallow the occupant of the káiûk.

In the vicinity of Saint Paul's and Saint George's Islands this Dolphin commits great depredations among the smaller individuals of the Fur Seals, repairing to those islands to breed. The Killer is certainly most numerous in the neighborhood of Kyska Island, for, on the north of that

island, and not ten miles from shore, I have seen not less than one hundred and fifty individuals at a single glance over the surface of the water; some of them appearing to have a length of not less than twenty-eight feet.

Near the recently formed island, Bogaslov, I witnessed several of these marine cut-throats chasing five Sea-lions. One of the Dolphins seized a nearly full-grown female Sea-lion, and in plain view, for the creatures were not fifty feet from the vessel, lying in a calm and but gently moving in the slight undulations of the sea, tore the throat from the huge beast, while the remainder of the Sea-lions were attempting to clamber upon the vessel, which they doubtless mistook for a rock. One of the "Killers" attempted to seize another Sea-lion, but just at that moment observed the vessel, and, while passing under her stern, received a shot from a rifle, which paralyzed it. The ball entered the "blow-hole," and a spirt of blood issued several feet high. The creature sank obliquely through the water. The muzzle of the gun was certainly not more than six feet from the Dolphin.

In the vicinity of Tigálda Island I witnessed two of these creatures attacking a very large Finback Whale. The latter was nearly exhausted by the persistent and impetuous lunges made upon it by its enemies. The sound of the splash made by the attacking Dolphins, as they leaped entirely out of the water and thundered upon the body of their prey, could be heard more than half a mile. It is not an unusual occurrence to find the carcass of some one of the larger species of the cetaceans, frequenting the Alaskan waters, with the throat torn out by the "Killer," which is said specially to relish the tongue of its huge victims; the remainder of the body often showing marks of the contest with its foes, for a single "Killer" never makes the attack, usually two to seven individuals engage in the struggle, endeavoring to cause the Whale to dive and be thus prevented from breathing, thereby the sooner becoming exhausted, as the merciless foes attack with the savage ferocity of enraged wolves.

The food of the "Killer" is suspected to be quite varied in character, for it is frequently seen following the schools of Surf Smelts, *Hypomesus olidus* (Pall) Gill, which occur in numbers beyond calculation near the sandy shores of some of the Aleutian Islands. Here are seen single "Killers", swimming amongst these little fishes; and, during the appearance of those Smelts, was the only time that I ever saw the "Killer" near the shore.

The Aleuts have a wholesome dread of this Dolphin. They relate numerous instances where a skin-canoe has been upset by them and the occupant devoured. I suspect, however, that the native touched a hidden rock, while attempting to discover the locality where the "Killer" would reappear, and that the misfortune was due to his own inadvertence. Let it be as it may, the Aleut of the present day betakes himself to the nearest landing place on discovering the proximity of an individual; and, when safely landed addresses it, claiming to have done neither it nor its relations any harm; and if the Killer fears to attack him in the water he may now have the opportunity to come out on land and try its strength as did its ancestors, which vainly contended with a human character of ancient times, in which the then amphibian "Killer" was worsted, and has since that time become strictly a creature of the water.

I had but little opportunity to observe this species from November to the following May, but am led to conclude that the various species of Dolphins do not remain in the vicinity of the sea-ice during the winter. They appear plentifully about the Aleutian Islands by the last of April, and probably follow the retreating ice to the northward, arriving at Saint Michael's by the middle of May Their breeding habits were not learned; although, very small individuals were observed as early as the middle of June, and these appeared well able to follow the adults.

The Alents speak of the Killer as *Aǵ lyuk*; and, to another species, which they recognize, they give the name *Um gú likh*.

I have seen what I believed to be two species, and perhaps three species, of the so-called "Killers," swimming together, all moving in the same direction.

Genus DELPHINAPTERUS.

DELPHINAPTERUS CATODON (Linné) Gill. *White Whale.*

The White Whale is of frequent occurrence in the more northern portions of Bering Sea. It is more littoral in its habits than any other cetacean, often ascending the larger fresh-water streams

for a distance of over a hundred miles. The Russian-speaking population refer to this Whale as the *Beluga*, a word which is properly referable to a huge species of Sturgeon, and by some strange misconception the name has been transplanted among the Alaskan people, and will forever remain. The Aleuts give the name *Há thakh* to the White Whale, while the mainland Innuit refer to it by the name *Kǐ lǐ lúg wûk* for the more northern villages, and variously-spelled words, such as *Stwûk* and *Stwak* for the middle and lower villages, respectively.

I have never seen this creature west of the Aliaska Peninsula. In the vicinity of the mouth of the Kuskokvim River and northward to the Arctic circle the abundance of these Whales is at times almost incredible; yet, where this year they may be plentiful they may be entirely absent the next season. It is a creature of very erratic habits and disposition.

This Whale is highly prized by the mainland Innuit for its flesh, oil and skin. They capture it in the early spring as it appears, among the last of the broken ice-fields, along the shore. The capture of one of these individuals is a source of great praise and profit to the slayer; and, for his portion receives the head and skin, while the remainder goes to the various people of the community. Not a few are taken in the seal-nets set in the late fall at Saint Michael's.

The natives in the vicinity of Cape Rumiantzof are more fortunate than those either north of the Yukon River or south of the Kuskokvim River, for here the country is so low that the spring-tides overflow great areas of the low-grounds and communicate with the shallow lagoons and lakes of that depressed area, lying near the sea between the mouths of those rivers. The inhabitants procure great numbers of these Whales as they repair to those lakes and evidently forget to go out with the tide, and thus fall an easy prey to the spear of the watchful native.

The Innuit of the southern side of the mouth of the Kuskokvim River are noted hunters of these Whales; and, the more readily to approach them they paint their káiûks with a whiteish clay, found in that vicinity, in order to represent a piece of floating ice, and thus be less liable to frighten the usually wary Beluga.

In the months of June and July the young, of nearly blackish-blue color, may be seen clinging to the back of the mother as she slowly comes to the surface to breathe.

The skin of the Beluga is converted into covers for skin boats and into boot-soles; but is not so highly valued as the skins of the larger species of seals, for the reason that it is not so impervious to water. The blubber is cut into long, narrow strips and placed within the stomach of either a Seal or of a White Whale itself. It is highly prized as an article of food, and is worth about fifty per cent. more than the same quantity of seal-oil. The flesh is very dark and full of blood, which remains in the distended veins through lack of proper means of bleeding. The intestines and larger food-receptacles are highly valued for making sky-light covers of the former and bags for containing oil or flesh from the latter.

I have eaten the fins and tails of these Whales and found, after they had lain in a strong brine for several hours, that the taste was not disagreeable when fresh.

Not having seen one of the White Whales south of Aliaska, I am not positive to what portion of the sea they go when the northern portions are covered with ice. It is certain that they do not occur about the western Aleutian Islands.

The food of the White Whale consists of the smaller species of marine fish, the smaller salmon being consumed in great quantities. I am not aware that it has any other enemy than man.

This species does not obtain the creamy-white skin until it is five years old. The newly-born young are about thirty to forty inches in length, but rapidly increase in size until they attain a length of six to eight feet, and then slowly grow to a maximum length of sixteen feet.

Genus MONODON.

MONODON MONOCEROS Linné. *Narwhal.*

The only information concerning the occurrence of the Narwhal on the Alaskan shore are the assertions (more properly traditions) of a large creature with a spear sticking from its head; they do not now occur in the vicinity of the coasts inhabited by the Malémut, who gave the information to me. They even had no name that I thought was reliable for this creature.

Genus PHOCÆNA.

PHOCÆNA VOMERINA Gill. *California Bay Porpoise.* (?) PHOCÆNA COMMUNIS.

This small Porpoise was observed only among the Aleutian Islands and in the vicinity of Kadiak.

In Captain's Harbor, Unalashka Island, this species is rather common. I have never seen it singly; usually two to seven individuals may be seen in the vicinity of the wharf; and, on two occasions these Puffing-Pigs have been taken on hooks baited for codfish.

The irregularity of their appearance prevented an opportunity to study their general habits.

The Russians-peaking people apply the name *svinka* to this Porpoise, while the Aleuts give it the name of *A lá gikh;* and to another small Porpoise they give the name *An gái gikh.*

FAMILY PHYSETERIDÆ. SPERM WHALES.

Genus PHYSETER.

PHYSETER MACROCEPHALUS Linné. *Sperm Whale.*

I saw but a single individual of this huge Whale in the Alaskan waters.

In the latter part of August, 1880, I was outside of the entrance to Chichagof Harbor at Attu Island. Not 500 yards off appeared a large Sperm Whale, making directly for the boat in which I was sitting. In a few minutes she appeared within fifty yards and presented an excellent opportunity for identification. This individual was certainly not less than eighty feet in length. She passed on out to seaward, while the natives were relating that in former times the Sperm Whale was a frequent, summer visitor to the Nearer Group of islands.

In the middle of July, 1881, a small individual was stranded on the west side of Captain's Harbor, Unalashka Island. This specimen was only about twenty feet in length, and so far advanced in decomposition that a near approach was impossible.

These are the only instances of the occurrence of this species; and I am led to conclude that it is now only an occasional visitor during the later summer months.

The Aleuts apply the term *Ag thá gikh* to the Sperm Whale.

FAMILY BALÆNIDÆ. WHALEBONE WHALES.

Genus RHACHIANECTES Cope.

RHACHIANECTES GLAUCUS Cope. *California Gray Whale.*

I am not certain that I ever saw this large whale, excepting on one occasion when crossing the northern portion of Unímak Pass, in the early part of June, 1878, where quite a number, probably a dozen, of these creatures were observed at some distance, slowly making their way into Bering Sea.

Genus MEGAPTERA.

MEGAPTERA VERSABILIS Cope. *Humpback Whale.*

The Humpback is quite plentiful in the waters of Bering Sea and to the south of the Aleutian Islands. Its extreme northern range is not known to me.

From the latter part of April to the last of October many individuals of this species occur in the immediate vicinity of Unalashka Island and are hunted by the Aleuts. The killing of these Whales was, in former times, attended with interesting ceremonies, often of a mysterious signification. The whale-hunters were considered as the great men of the village, and to them was paid special honors, not only while living but also after death.

At the present time the Aleutian whalers are confined to the islands lying eastward of and including Úmnak. At Iliuliuk but two or three persons are now living who are hardy enough to attack this large creature. In former years the head or point of the whale-spear was made of slate, but of later years it has been discarded, and the point is shaped from a portion of the side of a beer or thick wine bottle, the former being considered the better adapted, as the glass is brittle and more easily fashioned into the required form of three inches to four inches in length, and hav-

ing a breadth of two to two and a half inches, exclusive of the neck, by which it is affixed, by means of thongs, to the shaft of wood, which has a length of six to eight feet.

The hunter usually selects some young boy, of about sixteen years, to accompany him on the seach for these creatures. A two-holed káiuk is used, the boy acting as the propelling power when the prey is sighted, and on him depends much of the success of the hunter, who is of course the teacher of the boy as to the method to be pursued. The boy obeys implicitly all instructions; and, as the quest of whales is attended with much privation, they often undergo considerable suffering before one is struck.

The conditions of the weather are noted, for neither a gale nor a calm is ventured in, the latter enabling the Whale to observe the approach of the hunters, while a gently undulating sea is preferred for that reason. When a Whale is sighted the occupants of the canoe approach, with the least possible noise, and when near the place, where the Whale is expected to rise, the hunter lays aside his paddle and takes his spear in hand, and with it directs the boy where to proceed. As soon as the Whale rises the hunter launches the spear into the side of the creature, and the canoe is instantly urged backward out of the splash made by the plunge of the Whale. The motion of its body breaks off the brittle head of the spear, and each movement of the victim tends to drive the piece of glass deeper into its flesh until some vital spot is touched; the whale then sinks to the bottom, where it is supposed to remain for three days, when the gases, generated by decomposition, cause it to rise to the surface and, in course of time, is drifted to the shore. Persons are sent from the village to scan the sea for the floating carcass, or to search the coves, reefs, and bays for the stranded body.

The number of whales procured in this manner may amount, at Iliuliuk, to as many as fifteen in a single summer. In the summer of 1879 no less than seventeen were struck, and but three became available to the people; the currents and winds often carrying them far beyond the place where struck.

It was related to me that a whale carcass has been found on Unalashka Island that had a spear-head sticking in it, which had been thrown by a Kadiak native whaler; and the body had drifted nearly 600 miles in a west-southwest direction.

When the carcass of a cast whale is found, the people of the nearest village cease all other work and hasten to the scene, where the blubber and flesh is quickly stripped, and then carried to the village, where the pieces are hung up to dry for food.

In former times the entire Aleutian population lived to a great extent on the flesh and blubber from these creatures; but of late years their time is so much occupied with hunting sea-otters and seals that they devote but little time to the pursuit of them. The Atkhan and Attu people do not now engage in the chase of whales.

I have heard two names applied to the larger whales, and am not positive to which species they should be referred. I think the name of *Chi' thukh* belongs to the Humpback; and I question the application of the name *Chi ka'kh lukh* to the Finback.

On many of the islands of the Aleutian Chain are ancient village sites still showing the arrangement of the ribs of the larger cetaceans having been employed instead of wood to support the turf sides of their former dwellings. On Attu Island I saw a single slab, probably cut from the lower jaw of a sperm whale, that had been used as a door to the extrance of one of their ancient houses. The slab was about thirty inches wide by forty inches long, and nearly two inches thick. It required two men to carry it.

Genus BALÆNOPTERA.

BALÆNOPTERA DAVIDSONI Scam. *Finback Whale.*

There are certainly two species of Finback Whales occurring in the waters about the Aleutian Islands and the Peninsula of Aliaska.

There is considerable difference in the size of the two species; the larger one being more frequently seen on the south side of the islands and the peninsula, while the smaller is plentiful on the north side during May, June, and July.

Having but little opportunity to observe the actions of the two species, I must dismiss them by giving an Aleut word *Chi ka'kh lukh*, as applicable to one of the two species of Finbacks, though I am not certain to which it belongs.

Genus SIBBALDIUS.

SIBBALDIUS VELIFERUS (Cope). *Finback Whale.*

This large Finback Whale occurs mostly, according to my own observation, on the south side of the Aleutian Islands, and to the east as far as Kadiak.

An occasional individual is cast up on the shores of the eastern islands of the chain.

The Aleuts do not attempt to capture either of the species of the Finbacks at the present time, contenting themselves with the smaller Humpback.

SIBBALDIUS SULFUREUS (Cope). *Sulphur-bottom Whale.*

This large species of Whale does not to my knowledge occur west of Unimak Pass. The only individual ever seen by me was one near the Island of Ukámŭk, to the west of Kadiak, in August, 1881.

Genus BALÆNA.

BALÆNA JAPONICA Gray. *Pacific Right Whale.*

The only information I have of the occurrence of this species, in the waters here included, is from hearsay only. I have had no opportunity of observing an individual which I thought belonged to this species.

BALÆNA MYSTICETUS Linné. *Bowhead.*

This Arctic species of whale is so well known that any remarks I could make would add nothing to the history of this much-sought-for creature.

ORDER UNGULATA. UNGULATES.

FAMILY CERVIDÆ. THE DEERS.

Genus CERVUS.

CERVUS CANADENSIS Erx. *American Elk.*

It is somewhat questionable whether this mammal really occurs in the region here included. My only information, concerning its occurrence, is derived from miners, who have visited the southeast portions of the country.

Genus ALCES.

ALCES MACHLIS (Linné) Gray. *Moose.*

Within the past fifty years this huge beast has become quite plentiful in Alaska. The Yukon District and the headwaters of the Tananá, Kuskokvím, and the Nushagák Rivers are the scenes of abundance of Moose at all seasons. A single individual was killed in the vicinity of Pastólik, near Saint Michael's, in the early winter of 1876. This was the first instance of its occurrence, on the seacoast, north of the Yukon River.

Genus RANGIFER.

RANGIFER TARANDUS (Linné) Gray.

RANGIFER TARANDUS GRŒNLANDICUS (Kerr).

At the present writing I do not feel warranted in separating the Barren-ground Reindeer into two species, or even subspecies, for the distinctions are not sufficiently differentiated to substantiate the separation.

The Barren-ground Reindeer occurs plentifully throughout the entire open area of the broad territory under consideration.

A limit of time alone prevents me from giving an history of an animal so intimately connected with the very existence of the people dwelling in Alaska.

RANGIFER TARANDUS CARIBOU (Kerr). *Woodland Reindeer.*

This large Reindeer occurs most plentifully in the wooded portions of the territory, coming on the treeless areas, as may suit its convenience, at any season.

It is not known to occur north of the headwaters of the Tananá River, but is plentiful about the interior back of Bristol Bay and thence south.

FAMILY BOVIDÆ. THE CATTLE.

Genus OVIBOS.

OVIBOS MOSCHATUS Blainville. *Musk-ox.*

There is no positive evidence of the actual occurrence of this mammal within the region here included; but, as the northern Innit and Indians are so well acquainted with it, there can be no doubt that it has but recently disappeared, if scattered individuals do not yet inhabit the region northeast of the Rumiantzof Mountains and near the Arctic coast.

Genus OVIS.

OVIS MONTANA DALLI Nelson. *Dall's Mountain Sheep.*

From the material now in the National Museum, at Washington, D. C., there is sufficient reason to the claim being valid that the northern Mountain Sheep is entitled to rank at least as a subspecies. It is more than probable that it may prove, when additional information is obtained, of specific rank.

The range of this mammal is even to the low hills of the interior lying as far north as latitude sixty-eight, in this extreme range approaching quite near the western coast. The southern limit has not yet been defined.

ORDER RODENTIA.

FAMILY SCIURIDÆ. THE SQUIRRELS.

Genus ARCTOMYS.

ARCTOMYS PRUINOSUS Gmelin. *Hoary Marmot.*

The Hoary Marmot occurs in the interior of the region along the tributaries of the Yukon River; and, is more plentiful in the drier areas toward the southern portion of the Tananá River, Kuskokvim River, and the region east of Lake Ilyámna. The exact range of this rodent is not well known. The skins are brought in for trade, but as they possess no special value they are not much sought for.

The information, concerning its habits, came to me from the traders only, who have stations in those localities mentioned.

Genus SPERMOPHILUS.

SPERMOPHILUS EMPETRA EMPETRA (Pall.) Allen. *Parry's Spermophile.*

This rodent is quite plentiful in the region about Nuláto also to the eastward and south. Its exact range and habits are not known by me.

SPERMOPHILUS EMPETRA KADIACENSIS Allen. *Kadiak Spermophile.*

Originally described from Kadiak, this species has a range greatly beyond that island.

Having no opportunity to study the habits of the rodents in the country, I can add nothing that is not already known concerning the larger species.

Genus SCIURUS.

SCIURUS HUDSONIUS HUDSONIUS (Pallas) Allen. *Hudsonian Squirrel.*

I am not positive that the Squirrel obtained by me from the wooded portions of the Yukon district should be referred to this species.

Genus SCIUROPTERUS.

SCIUROPTERUS VOLUCELLA HUDSONIUS (Gmelin) Allen. *Northern Flying Squirrel.*

Not having seen an individual of this species in Alaska, and my information being only from hearsay, yet sufficiently trustworthy to believe, that a species of Flying Squirrel occurs in the eastern part of the Nushagak and Cook's Inlet regions, I can but doubtfully refer it to this species

FAMILY CASTORIDÆ. THE BEAVERS.

Genus CASTOR.

CASTOR FIBER (Linné). *Beaver.*

The Beaver is generally distributed over all the mainland of Alaska, excepting the immediate coast and the more mountainous portions from latitude sixty-seven to the extreme northern portion.

The number of Beaver is said to be rapidly diminishing; not only by the persecution by man, but from other causes not well understood. There being less demand than formerly may, perhaps, allow this important, fur-bearing mammal to regain its wonted abundance.

FAMILY MURIDÆ. THE MICE.

Genus FIBER.

FIBER ZIBITHECUS (Linné) Cuvier. *Muskrat.*

This mammal has a range over all the region of the mainland south of latitude sixty-eight. It is extraordinarily abundant in the marshy tracts of the mainland between latitude sixty-four and fifty-nine, especially so between the Yukon and Nushagak rivers. Its habits are so well known that they need not be repeated.

Genus CUNICULUS.

CUNICULUS TORQUATUS (Pall.) Coues. *White Lemming.*

This Lemming occurs in the northern portions only, that I am aware of, from the shores of the Arctic Ocean to latitude sixty.

It cannot be said to occur plentifully in any particular portion of the region; scattered individuals were all that I ever saw; and, as they are more readily perceived in the late fall, when they have assumed their silky coat of pure white fur, their habits could not be ascertained.

When in this condition the Innuit give them the name *Ki lûg myú tûk*, or inhabitants of the upper regions; for those people stoutly maintain that these creatures drop from the sky during a snowfall.

Genus MYODES.

MYODES OBENSIS Brandt. *Tawny Lemming.*

This species has a much greater range than the white species, occurring throughout the mainland of northern North America.

It is, according to my own experience, much more plentiful than the White Lemming. Its habits were not well ascertained. This and the preceding species are the well-known "Deer-footed Mice" of the traders in the northern regions; the delusion arising from the peculiar processes appearing on the claws of the forefeet, and which are deciduous as soon as the snow melts in the spring.

Of the smaller Muridæ the following genera and species are known to occur within the territory; but as they are of no special importance merely a list of them will be given:

SYNAPTOMYS COOPERI Baird.
EVOTOMYS RUTILUS (Pall.) Coues.
ARVICOLA RIPARIUS BOREALIS (Rich.) Coues.
ARVICOLA XANTHOGNATHUS Leach.
HESPEROMYS LEUCOPUS SONORIENSIS (Le Conte) Coues.

All of which occur on the mainland.

FAMILY HYSTRICIDÆ. PORCUPINES.

Genus ERETHRIZON.

ERETHRIZON DORSATUS EPIXANTHUS (Brandt) Allen.

This species occurs on the mainland, from the Arctic circle to the southern limits of the region, and is occasionally found on the extreme western end of Aliaska. To this species has been given the name *Núnik*, a word of Aleutian origin and now transplanted among the people of the mainland of Alaska. The Russian name is, however, quite different. The Innuit name is *I lán ku chûk.*

FAMILY LEPORIDÆ. THE HARES.

Genus LEPUS.

LEPUS TIMIDUS Linné. *Polar Hare.*

Occurs most plentifully about the treeless areas, and prefers the dreary coast to the interior.

LEPUS AMERICANUS AMERICANUS (Erx.) Allen. *Northern Varying Hare.*

Very plentiful throughout the wooded and bushy portions of the region. It seldom wanders on the barren areas. Both species of hares are confined to the mainland, excepting the Polar Hare, which is often found on Unimak Island, to which it travels on the ice formed over "False" Pass. The smaller Hare does not occur on the western portion of Aliaska, hence does not reach any of the Aleutian Islands.

ORDER CHIROPTERA. BATS.

FAMILY VESPERTILIONIDÆ. TRUE BATS.

Genus (?)

A species of Bat is asserted to be quite plentiful on Kadiak Island, and ranges in summer as far north as Fort Yukon and Nuláto.

To what genus it should be referred I shall not attempt to decide, as a specimen never came into my possession while I was in the Territory.

ORDER INSECTIVORA. INSECTIVORES.

FAMILY SORICIDÆ. SHREWS.

Genus SOREX.

SOREX FORSTERI Richardson. *Forster's Shrew.*

This little creature apparently ranges throughout the territory, from the Arctic Ocean to the southern limits.

SOREX COOPERI Bachman. *Cooper's Shrew.*

(?) SOREX SPHAGNICOLA Coues.

A species of Shrew was collected at Saint Michael's, but has been mislaid, and the determination of these insignificant creatures is too difficult to be attempted without great study and sufficiency of material for comparison. A species of Shrew occurs near the large lake at the head of the spit on which Iliuliuk village is built. Specimens were not preserved, so that it is impossible to refer it to any genus or species.

Before dismissing the rodents, it may be well to state that no species of mouse, rat, or shrew occurs on the extreme western islands of the Aleutian Chain. A number of the common house mouse and rat are to be found on Atkha and to the eastward. The rats on Atkha are very large and extremely vicious, often contending the pathway near the rocks, which shelter them from the attacks of foxes and birds of prey.

Order CARNIVORA. Flesh-Eaters.

Family OTARIIDÆ. Eared Seals.

Genus Eumetopias.

Eumetopias stelleri (Lesson) Peters. *Northern Sea-Lion.*

Too well known to need discussion in this connection. Its range extending to latitude sixty-five degrees north; here, however, merely stragglers occur, being, doubtless, the males worsted on the hauling-grounds farther south, and the barren females driven from those places.

Genus Callorhinus.

Callorhinus ursinus (Linné) Gray. *Fur Seal; Alaskan Fur Seal.*

Bering Sea, from latitude sixty south into the Pacific Ocean. Migratory only into Bering Sea This species has been so accurately described by Mr. H. W. Elliott* that further comment upon the creature would be useless. In the spring of 1873 a scarred male Fur Seal was killed in Tebenkof Cove, a couple of miles southwest of St. Michael's Redoubt. The individual was so exhausted, from his wounds and journey, that he made no attempt to escape when approached.

Family PHOCIDÆ. Hair Seals.

Genus Phoca.

Phoca vitulina Linné. *Harbor Seal.*

The entire coast line and Aleutian Islands are frequented by this small species, which is highly prized by all the inhabitants.

Phoca grœnlándica Fabr. *Harp Seal.*

All the Arctic shore, Bering Sea, and among the Aleutian Islands.

Phoca fœtida Fabr. *Ringed Seal.*

Has the same range as the preceding, but disposed to be more plentiful in the northern and middle portions of its range.

Phoca fasciata Zimmerman. *Ribbon Seal.*

This species is confined to the eastern portion of Bering Sea, having its center of abundance, so far as is known, in the vicinity of Nunivak Island.

Genus Erignathus.

Erignathus barbatus (Fabr.) Gill. *Square-flipper Seal; Bearded Seal.*

Most plentiful in the eastern and northern portions of Bering Sea. Among all the Aleutian Islands is not so plentiful as is reported to have been in former years.

Family URSIDÆ. The Bears.

Genus Ursus.

Ursus americanus Pallas. *Black Bear.*

The Black Bear ranges throughout the wooded portions of Alaska. It is very plentiful in certain tracts along the Yukon valley, Kuskokvim River, Nushagak River, and thence southward and interior.

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* A monograph of the Seal Islands of Alaska. Sepecial Bulletin 176. Reprinted, with additions, from the report on the Fishery Industries of the Tenth Census. Washington: Government Printing Office, 1882.

URSUS HORRIBILIS Ord. *Grizzly Bear.*

As I have not seen an undoubted individual of this beast within the territory I can only give the assertions of others who have described an immense bear from the interior along the southeastern portions of the Yukon River.

From the description I should conclude that the Grizzly Bear was referred to. Along that river the creature referred to ventures nearly to the Arctic circle.

URSUS RICHARDSONI Aud. & Bach. *Barren-ground Bear.*

As the name indicates, this species is confined to the treeless areas of the territory. It is sufficiently plentiful for all purposes; having its center of abundance on the area about the eastern end of Aliaska, although ranging to the extreme northern land. It occurs on Unimak, the eastern Aleutian Island.

The largest skin of a wild beast that I ever saw was taken from a huge male of this species killed within a few hundred yards of Pastolik, near the Yukon Delta.

FAMILY ODOBÆNIDÆ. WALRUSES.

Genus ODOBÆNUS.

ODOBÆNUS OBESUS (Ill.) Allen. *Pacific Walrus.*

Bering Sea, rarely descending south of the Aleutian Islands. Formerly had a greater southern range. Now restricted to the northern portions of the Pacific. Occurs very rarely among the Aleutian Islands. A two-year old male was killed on Attu Island in September, 1880.

FAMILY PROCYONIDÆ. RACCOONS.

Genus PROCYON.

PROCYON LOTOR (Linné) Storr. *Raccoon.*

I have heard, on what I consider reliable authority, that the Raccoon is not uncommon in the south portions of the Alaskan mainland.

FAMILY MUSTILIDÆ. WEASELS.

Genus ENHYDRIS.

ENHYDRIS LUTRIS (Linné) DeKay. *Sea Otter.*

Occurs now only in south Bering Sea and North Pacific Ocean. Most plentiful between latitudes fifty-six and fifty north.

Genus LUTRA.

LUTRA CANADENSIS (Turton) F. Cuv. *North American Otter.*

Entire mainland of Alaska south of latitude sixty-eight.

LUTRA FELINA Molina. *Chinchimen.*

This species is supposed to occur in the southern portions of the Alaskan mainland only.

Genus GULO.

GULO LUSCUS (Linné) Sabine. *Wolverine.*

All the mainland of Alaska; more plentiful near the wooded areas.

Genus PUTORIUS.

PUTORIUS VISON (Schreber) Gapper. *American Mink.*

All the mainland of Alaska south of latitude sixty-eight. Very abundant on certain marshy areas of middle Alaska.

PUTORIUS VULGARIS Linné. *Least Weasel.*

All the mainland of Alaska.

PUTORIUS ERMINEA (Linné) Griffith. *Ermine; Stoat.*

This species has the same range as the preceding.

Genus MUSTELA.

MUSTELA PENNANTI Erxleben. *Pekan; Pennant's Marten; Fisher.*

Occurs sparingly in the upper Yukon Valley; rather more abundant in the heavier timbered regions to the south.

MUSTELA AMERICANA Turton. *Marten; American Sable.*

Very plentiful in the wooded areas; occasionally venturing to the rocky, barren tracts of the mainland only.

FAMILY CANIDÆ. THE DOGS.

Genus VULPES.

VULPES FULVUS FULVUS (Desmarest). *Red Fox.*

All the mainland, excepting the immediate north coast; Saint Lawrence Island; Aleutian Islands as far west as Umnak.

VULPES FULVUS ARGENTATUS (Shaw) Aud. and Bach. *Silver Fox; Black Fox.*

All of Alaska, excepting the extreme western Aleutian Islands, Pribylof Group and Saint Mathew's Island.

VULPES FULVUS DECUSSATUS (Desm.). *Cross Fox.*

All of Alaska, excepting certain islands to the extreme west of the chain, the Pribylof Group and (?) Saint Mathew's.

VULPES LAGOPUS (Linné) Gray. *White Fox; Arctic Fox; including the Blue Fox.*

The White Fox occurs only in the more northern portions of the mainland; occasionally carried to the more northern islands of Bering Sea by means of ice fields. The Blue Fox occurring on the mainland south of the Arctic circle and on all of the Aleutian islands, attaining best condition on the Pribylof Group and the western Aleutian Islands. At the latter place it is the only terrestrial mammal.

CANIS LUPUS GRISEO-ALBUS (Linn). Sabine. *Gray Wolf.*

This wolf ranges over all the mainland of Alaska. On the Aleutian Islands it occurs only on Unimak; attaining that locality by crossing on the ice, from the north, jamming into "False", or Isanotsky, Pass, separating that island from Aliaska.

FAMILY FELIDÆ. THE CATS.

Genus LYNX.

LYNX BOREALIS CANADENSIS (Gray) Mivart. *Canada Lynx.*

Wooded portions of the mainland; rarely wandering on the treeless areas.

(Future investigations into the natural history of Alaska and its neighboring waters will certainly reveal many additional species to be added to the list given in this connection and may require a revision of some of those already listed.)

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NOTE.—A few errors occurring in the scientific names in the text are corrected in the index.

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